

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE;

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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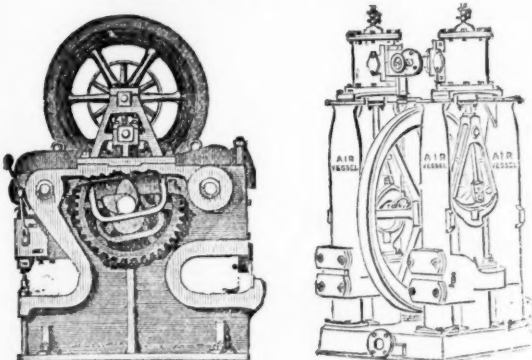
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PARIS,
BRONZE MEDAL, 1867.



ORDER OF THE CROWN OF PRUSSIA.



FALMOUTH,
SILVER MEDAL, 1867

A DIPLOMA—HIGHEST OF ALL AWARDS—given by the
Geographical Congress, Paris, 1875—M. Favre, Contractor, having
exhibited the McKean Drill alone as the MODEL BORING MACHINE
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SILVER MEDAL of the Highland and West of Scotland
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Are exclusively used, the advance made during eight consecu-
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Machines for the SEVERN TUNNEL; the LONDON AND
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Drill—may be worked at a higher pressure than any other
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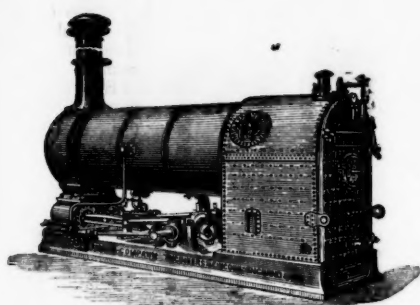
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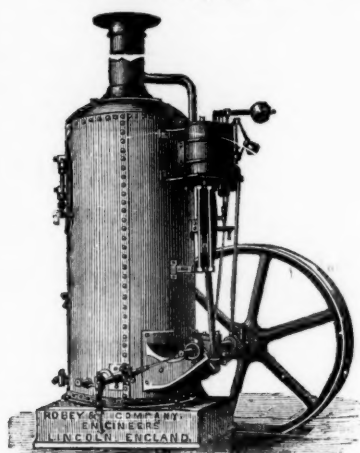
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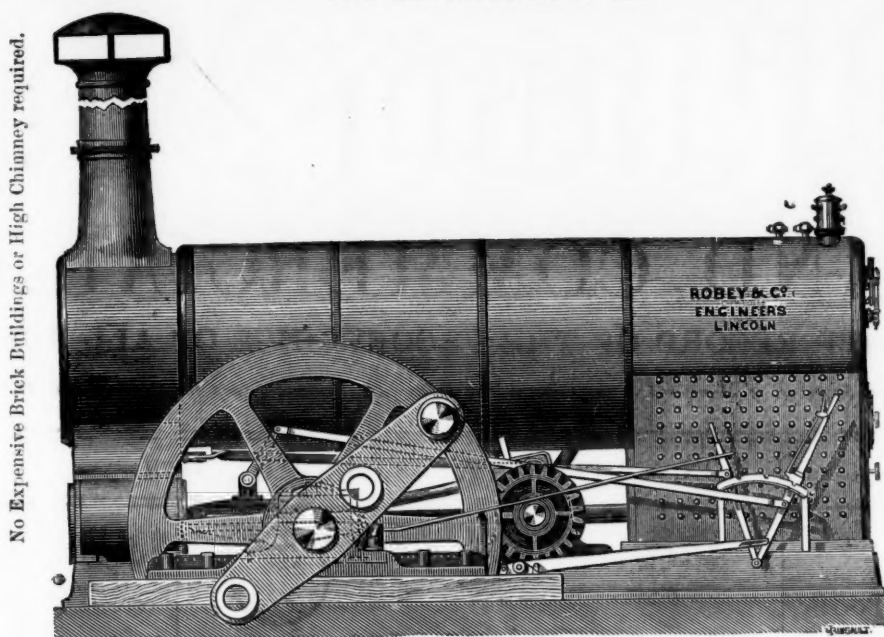
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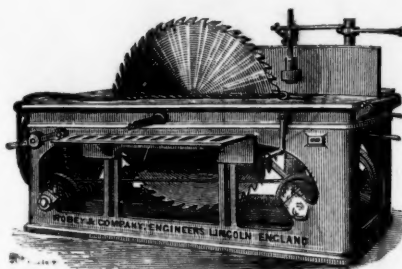
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(Also above illustrated) is admirably adapted for driving Rolling Mills, Saw Mills, Brick Machinery, Pumping Machinery, and all descriptions of Fixed Machinery.

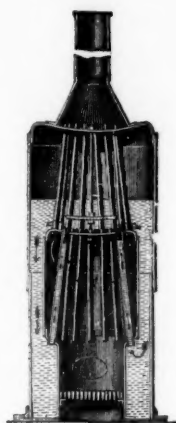
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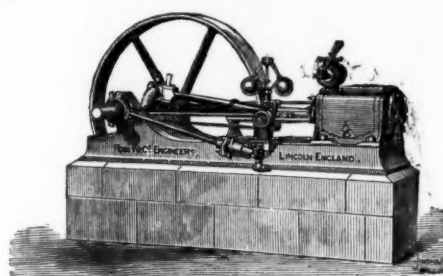
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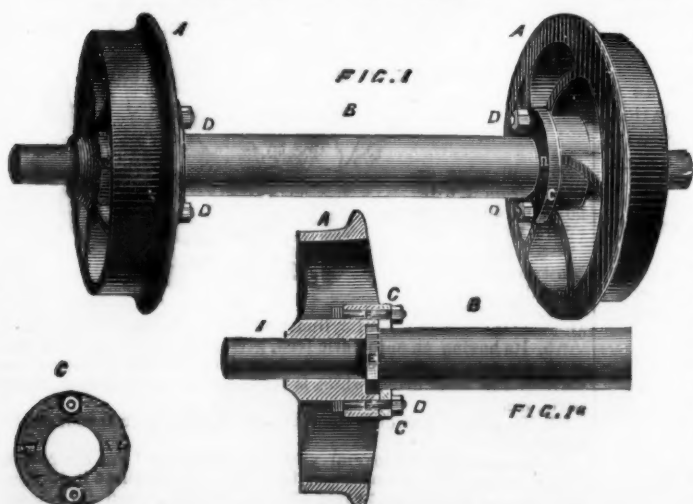
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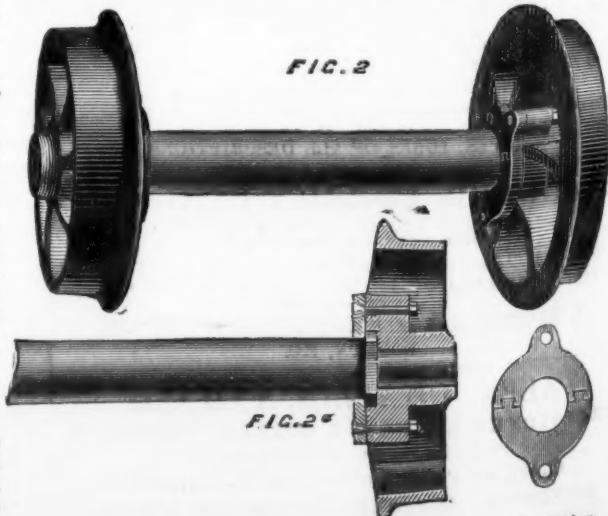
A New Patent Method of Fitting up Wheels and Axles.



Figs. 1 and 1a show a longitudinal view and plan of a pair of corf wheels and axles fitted up for outside bearings. Figs. 2 and 2a for inside bearings. A A are the wheels; B, is the axle; C C, the washers; D D, the bolts; E, the collar on axle B; and F, the recessed boss in the wheel.

The wheel is cast with a recessed boss in the inside, made to any shape, corresponding in shape and depth with a collar formed on the axle, which is forged of solid steel; the axle is secured into the recess partly by being sufficiently tightly fitted to require driving home with a hammer, and partly by the washer. Around the axle adjoining the boss is fixed the washer, made in two parts and dovetailed, so as to allow of being fixed after the collar has been forged on the axle. The washer is secured to the boss by bolts and nuts, both in outside and inside bearings; in the case of inside, by means of lugs cast on the boss, and the washer made of corresponding shape; the washer is made of crucible cast steel. The only tool required for fitting is an ordinary spanner for outside bearings, and a box spanner for inside bearings.

Now what are the advantages of this method? You secure a simple way of fitting—it can be done by anyone who has seen it—the only tool required being a spanner; the wheels can be detached from or secured to the axle in a few minutes. The next



advantage is the perfect solidity attained, the wheel and axle practically becoming as one piece. The durability results from the toughness of the material, and the solidity secured in the fitting. Another thing is the wheels do not need to be put in the fire to detach them, as is the case in ordinary wheels. (N.B.—Our wheels cannot be injured by being heated and plunged into cold water, which would render other steel wheels perfectly brittle as glass.) Saving in fuel and wages is evident—no skilled labour being required to refit wheels in case of a strained axle. By adopting this system colliery owners may save hundreds of pounds sterling yearly.

Original Correspondence.

SEPARATION OF SULPHUR FROM ITS ORES.

SIR.—I have read with some interest an extract from the Salt Lake Herald, published in the *Mining Journal* of Aug. 10, page 884, in which it is stated that a United States patent has been granted to Mr. Henry Sewell, M.E., for a furnace for the separation of sulphur from its ore. From the imperfect data given it would appear that this process is simply that which is in general use at the present time in Sicily—that the ore is fired in "calcheroni," or large open kilns, in which it is heaped, a portion of the sulphur contained in the ore being burnt to produce the heat necessary to melt out the remainder. A "calcheroni," or kiln, consists merely in a semi-circular wall enclosing one half of the circular floor, which is formed of finely sifted "ginesi," or spent ore, firmly rammed; this floor is made with an inclination of about 1 in 4 or 5. The walls are built of coarse rubble stone, set in plaster made from the gypsum, which is one of the accompanying rocks of the sulphur formation; in some cases even the spent ore itself makes an excellent building material. The diameter of a calcheroni varies from 4 or 5 meters to from 20 to 30, and its capacity is said to be of so many *cassa*. The size of the *cassa*, however, varies considerably in the different districts. In the middle of the wall, corresponding to the lowest part of the floor, a rectangular opening 4 or 5 ft. in height and 1 ft. in width, called "la morte," is left. In loading a calcheroni a number of large stones are heaped up at the "morte" so as to leave a covered passage 4 or 5 ft. in length towards the centre of the kiln; this is called "le porte," and serves as a space for the melted sulphur to collect before being run off. The rectangular opening, or "morte," is then closed with a kiln wall, and the loading of the calcheroni begins—first, by placing the larger lumps of ore on the floor in such a manner as to leave a free passage for the melted sulphur towards the "morte," and on this the ore is heaped, care being taken to place the larger lumps in the middle and bottom and the smaller towards the top and outside; in this manner the flow of the sulphur as it melts is not intercepted, as would be the case were no care taken in the loading, and the large and small pieces indiscriminately thrown in together.

The ore is heaped up above the top of the floor so as to form a truncated cone, the height of which naturally varies with the diameter of the calcheroni. This cone is covered with fine "ginesi," or spent ore, from former fusions, with the exception of a rectangular space at the back or opposite side to the "morte," and the ore is fired by placing on it a few bundles of dried weeds or straw that has been previously dipped in melted sulphur. After five or six hours, or even more, according to the state of the ore, whether wet or dry, the season of the year, quality of the ore, &c., so as to give the heat time to be well alight, this space is covered with "ginesi," and the calcheroni is left to itself, and requires only occasional attention to prevent any places burning too rapidly and the fire spreading unequally towards the front. The thickness of the covering varies from 2 or 3 in. to as much as 10 in., according to the quality of the ore in fusion, the weather, &c. After eight or ten days the melted sulphur commences to flow to the "morte," and finding it relatively cold it becomes solid, forming the so-called "intavolatura"; this it is necessary to remelt, and for this purpose a hole is made in the thin wall which closes the "morte," and small bunches of straw dipped in melted sulphur are lighted and introduced. In this manner the vacant space becomes heated sufficiently, and the melted sulphur flows readily from the hole into wooden moulds, called "gavite," and on solidifying form cakes, or "batate," of sulphur, weighing about 55 kils., or (say) 121 lbs. each. Care has to be taken to prevent the internal heat of the calcheroni becoming too low, in which case the melted sulphur fills up the spaces between the stones that form the "porte," and solidifying impedes the flow of the sulphur to the "morte," and in this case the calcheroni is said to be "incanarato," or stopped, and the sulphur contained in the ore at the back would all be burnt, without being able to run any off. This defect may be remedied by opening the "morte" and removing a portion of the covering at the back of the heap, so as to produce a greater draught, and thereby increase the rate of combustion. In some cases the calcheroni becomes too hot, and water has to be thrown in at the "morte" and more covering put on.

The duration of a fusion depends upon the quality of the ore, and in a great measure upon the size of the calcheroni, but no rule can be laid down. However, generally speaking, a calcheroni containing from 500 to 700 tons of ore requires thirty days from the time it is lighted to that when the last sulphur is run off, and another thirty days before it has cooled down sufficiently to be unloaded. The chief merits of this process are its extreme simplicity and the large quantity of ore that can be treated at once; but at the same time it must be borne in mind that it is extremely wasteful, as a large quantity of sulphur must be burnt to furnish the heat necessary to melt the remainder, and I believe that I am not exaggerating in stating that at least one-half of the sulphur contained in the ore is lost, and is given off into the air, to the detriment of the neighbouring crops, and for this reason the fusion of the sulphur is only permitted after the harvest to the end of December. This is naturally a great drawback to the owners of mines, as they are forced to smelt all the ore raised during the year in four or five months, and a large amount of capital has to remain idle.

There is no doubt that calcheroni, where the ground is favourable and materials close at hand, can be built for \$200 each, or (say) 1000 Italian lire, of a capacity of 200 tons, or even more, and that two men are sufficient to attend to five of them, always provided that they are built close together (these men, of course, do not load them). As a rule, in Sicily, we prefer building them larger, or (say) to hold 700 or 800 tons of ore. In some cases they are far larger, and have been made to contain 7000 tons of ore, but this is an exception, as few mineowners would care to risk so large an amount as the value of 7000 tons of ore in a single calcheroni, but prefer to divide it over several.

That a kiln will last a number of years, as Mr. Sewell's advertisement states, is very certain, and generally speaking, if not totally destroyed by landslides, which are of frequent occurrence in Sicily, they have to be abandoned from the quantities of spent ore which has accumulated round them, making the distance too great for them to be unloaded economically, and it is found more advantageous to build a new one than to increase the price of unloading. They, of course, require occasional repairs, and the floors especially have to be partially or wholly renewed after every four or five fusions.

With regard to the steam process which is referred to in your extract from the Salt Lake Herald, it is in use successfully at some mines in Sicily, but it is said that it is only suited for the treatment of certain classes of ore. Of course a good supply of water must be at hand, and as this is scarce at many mines, this process could not be applied successfully everywhere, and it would be too expensive to carry on at any distance in this country.

The smelting of sulphur in iron retorts, as practised in the Romagna, has never been adopted in Sicily, and it is obvious that with the cost of fuel (coal) in the middle of the island, which may be taken at 70 lire per ton, it would never pay.

The rich ores of Lercara, called *Talamone*, were at one time, and I believe to some extent are so still, melted in open cast-iron pans heated over wood fires; the ore is put in a little at a time and the salting matters ladled out, and when all the sulphur is melted the impurities are allowed to settle at the bottom before ladling off the comparatively pure sulphur into moulds.

If Mr. Sewell's process is no improvement upon that which I have just described, I am afraid that we are no nearer the solution of the problem of separating the sulphur from its ore than we were years ago, and I cannot see clearly how a patent could be granted for a process which is in daily use. At the same time, I wish Mr. Sewell every success in his undertaking, but I am afraid that unless he adopts coal or coke in the place of sulphur as a fuel he will not obtain better results than we are now getting from the common calcheroni. It has been seen that with the calcheroni sulphur itself is the fuel, and whilst at the same time we are using an expensive and low heat-producing fuel, we are burning it in a most uneconomical manner. I know from experience that the problem is not so easy as it appears at first sight, but we should bear in mind that it is worth trying to solve, and that we can obtain as much heat from 1 ton of good coal as from 4 tons of sulphur, and that if we could hit upon a means of applying it to advantage we ought to utilise as much heat from 1 ton of coal as from 8 tons of sulphur burnt as it is to a disadvantage in the calcheroni.

Palermo, Aug. 17. A SICILIAN SULPHUR MINER.

TREATMENT OF COPPER AND SILVER ORES.

SIR.—In the *Journal* of July 20 there is a letter from M. A. Drouin describing his process for extracting copper and silver from poor ores. From this I gather that M. Drouin claims to be able to utilise ore containing only 1 per cent. of copper. This question is so important to many mines and mining companies which possess immense quantities of poor ores, at present worthless, that I expected to have seen some replies to M. Drouin's statements, but as none have appeared, I venture to ask some of your readers who are well up in this subject to discuss it. Is pyrites attacked in any way by a solution of salt and acid? If M. Drouin is able to extract the copper from pyrites without driving off the sulphur, and with only such "preliminary roasting" as he mentions, I conclude that he claims to be able to decompose pyrites by means of his solution, and to dissolve out the copper from it. M. Drouin also says—"And in a few hours' time the whole of the copper and silver is extracted in the cold, no heat being necessary." Is silver soluble in a cold solution of salt and sulphuric acid? And lastly, M. Drouin says—"The scrap iron used is about 75 per cent. of the copper produced." It has been my experience that with a nearly neutral solution, about 75 per cent. of iron is required, but that with a slightly acid solution the consumption of iron is increased, so that it seems to me that with a strong acid solution, such as M. Drouin's process seems to require, the proportion of iron would be considerably over cent. per cent. If M. Drouin's process would do what he claims for it it would be an immense benefit to very many mines, but such statements as these, if incorrect and allowed to go uncontradicted, may do a great deal of harm by inducing mines which can ill afford to waste any capital to spend money on experiments which will be entirely thrown away.—St. Clements House, Aug. 20. C. E.

RICHMOND MINING COMPANY.

SIR.—In last week's *Journal* Mr. Elliott writes that my letter, which appeared in the *Journal* of Aug. 10, contained "serious inaccuracies, which it is important to correct, and erroneous conclusions it is essential to refute." I am most willing to be corrected if I have erred in my statements, and to withdraw any mistaken conclusions. I leave this matter to the judgment of the general body of shareholders after they have read my letter, and the one by Mr. Elliott. I can assure Mr. Elliott that I looked very carefully through the official file of Richmond reports and circulars to see if there was a circular to the shareholders previous to the directors' report of Nov. 18, 1873, which in any way alluded to the creation, &c., of the Nevada Company. I could not find any, and I judge from the wording of the directors' report that no such circular as Mr. Elliott mentions was issued to the shareholders. The paragraph in that report was as follows:—"During the progress of the suit, counsel advised that for the better protection of the company's interests it was imperatively necessary to incorporate the company in the United States of America, in conformity with the laws of the State of Nevada; this was accordingly done in the name of the Richmond Mining Company of Nevada."

Mr. Elliott states that Mr. Streeter, a barrister, and one of the first directors of the company, was sent out to examine the property, and to see that the title was good, and the patent to the property was obtained before the transfer was completed. He lays the blame of accepting the property from the vendors without the patent on Mr. Streeter, but surely Mr. Elliott and the other directors are equally to blame for purchasing a property in Nevada, even with the United States patent to it, which they could not control or work directly themselves, because the laws of that State did not allow aliens to hold, work, and inherit property therein. This fact, in regard to aliens, was as well known in 1871, when they purchased the property, as in 1873; and it is most strange that under such circumstances the vendors were successful in selling the property in London for so large a sum. Mr. Elliott then relates how the property was decided over to Prof. Fisher, who was the first manager and sole agent of the English company, and how Prof. Fisher subsequently betrayed his trust, and had to be paid 2000*l.* to induce him to surrender the property to Mr. King.

Although I knew of this fact, I did not quote it in my letter as I might have done, to give additional significance to those editorial statements in the *Eureka Sentinel* of June 27, as to Mr. Probert's legal ability to "retain possession of the property." As Mr. Probert knew that the *Eureka Sentinel* is regularly forwarded to the London office, where it is read by the directors, the company's solicitor, and by several of the more cautious shareholders, it is most extraordinary that he has never repudiated those ugly statements. Mr. Elliott clearly admits that the Nevada Company, through its officers, has absolute control over the property, and that the directors of the English company have no control except as representing 10,995 shares out of the 11,000 shares which constitute the capital stock of the Nevada Company. Mr. Elliott, however, is clearly wrong in stating that the English company is at present "endowed with a power which for all practical purposes is ample and absolute," because he of all others must know that the directors have given Mr. Probert their proxy for the 10,995 shares, which power is as good as any power of attorney, as Mr. Probert holds it all the time, and can use it at any time to call a meeting of the shareholders of the Nevada Company, and he and the other two trustees can amend the by-laws of that company, and do anything else they please without the directors of the English company ever knowing that any meeting had been called, or what business had been transacted. I am sure that the general body of English shareholders are ignorant of this fact, especially as it is entirely contrary to the usual way of conducting business in this country. Whoever thinks of giving the directors of the English company his power of proxy for them to use all the time, or on any special occasion, without being consulted or kept informed as to the business for which it is used? Mr. Elliott states that the "English board having implicit faith in Mr. Probert's integrity, considered such an arrangement entirely satisfactory." Surely this is mere sentiment, and not business. For the same reason the shareholders might say "We do not require a board of directors simply to accept and endorse all that Mr. Probert initiates and directs; we can employ a clerk on 100*l.* a year to do that." When Mr. Probert in his evidence states that he is only a subordinate to the president of the Nevada Company, and that every act of his must be submitted to the president, consequently the interests of the English shareholders are virtually centred in the president of the Nevada Company, and who has stated that "it would not be a breach of trust if the property were not conveyed to the English company at their request."

Mr. Elliott says, in reference to this most extraordinary evidence of Messrs. Probert and Wren, that "the answers obtained must be taken as the technical legal definitions of its (the Nevada Company's) position. I really cannot follow Mr. Elliott in this. What is absolutely false cannot be true. Messrs. Probert and Wren swore to what the Court believed on their evidence to be the facts, because the Court rendered its decision on Feb. 9, 1877, which non-suited the Eureka Company. The Court decided that the Nevada Company was not a myth; that the English company was not in possession of the property; that Mr. Rickard had not taken possession of the property in the name of the English company; and that at the time of commencing the suit, and also at the date of this decision, the Nevada Company was in possession of the property.

The facts are that the board assigned the property to Prof. Fisher in 1872; he assigned it to Mr. King, who assigned it to the Nevada Company on its creation in 1873, which company reassigned it to the board on Feb. 29, 1876, and then the board on Feb. 20, 1877, re-conveyed it to the Nevada Company, so that from Feb. 20, 1876, to Feb. 20, 1877, the English company was in actual possession and

absolute control of the property. The suit of the Eureka Company against the English company was commenced on Feb. 1, 1877. On the 7th Mr. Probert gave his evidence, and on the 9th, and after the Court had rendered its decision, he cabled to the board to reconvey the property immediately to the Nevada Company, but he did not inform the board that he had already testified that the English company did not own or control the property in Eureka.

The course pursued by Messrs. Probert and Wren in thus upsetting the Eureka Company's proceedings against the English company was clearly a very dangerous one for themselves, and, as it turned out, a very disastrous one for the English company. The delay of six months, caused by this action, enabled the Eureka Company to more fully develop their big lode theory, and to make (what Mr. Probert states he always feared) an ore connection between their Margaret patented ground and the Pott's chamber, which they could not have done had the original proceedings been allowed to stand. What could the English company have suffered had the original suit been continued? The property had been entirely mortgaged to the English debenture holders in 1876, and the mortgage deed had been properly recorded in Eureka. The following is what Mr. Elliott told the shareholders at the adjourned meeting held on Aug. 23, 1877:—"You may recollect that at the time it was necessary to raise money by debentures that the whole of the property was decided over to Mr. Hopkins and myself as trustees for the debenture holders. We, therefore, hold in your interests a mortgage over the whole of the assets of the company; and, in fact, over the whole of the property. It may or may not be necessary to put that power in force."

This being so, why did the board reconvey the property to the Nevada Company? Mr. Probert was himself one of the debenture holders, and knew that the 38,000*l.* had been raised by these debentures for a working capital, and yet he gave evidence that he did not know that the money or the property of the English company paid the working expenses at Eureka. When I was in Eureka in 1877 I heard Mr. Wren and others say that Judge Cole, who heard the first suit in February, 1877, would have decided against the contention of the Eureka Company on the evidence given in the subsequent suit.

I think the shareholders should ask Mr. Elliott how it was that the board, under his regime, never directed the managers at Eureka to obtain an Act of the Nevada Legislature to enable aliens to hold and inherit property in that State. This was clearly the common-sense and business-like course to have pursued when it was known that aliens could not control and work the property in Nevada. I am quite sure that such an Act could have been obtained when the Legislature met in 1874, and again in 1876. I have heard Judge Wren and leading men connected with mining interests in Nevada say that such an Act could be easily passed. In 1872 I was interested with Mr. Ralston and others in the purchase, irrigation, and general improvement of an extensive tract of country in the State of California. We required the assistance of English capital, and to enable this to be done with proper security to the English investors it was found necessary to obtain from the State Legislature an Act enabling aliens, resident and non-resident, to hold and inherit property in that State. This Act was accordingly obtained, and came into force on Jan. 1, 1873. The same freedom is granted to aliens in Colorado, Oregon, and Utah, and in a few other States in the Union.

The Plumas Eureka, the Sierra Buttes, and other English mining properties in California do not require the intervention of an American Company. It is clearly to the interests of those owning mining properties in the State of Nevada that English capital be safely invested, and under English control in that State, and I cannot conceive of any active and effective opposition being offered to the passage of such an Act by the Legislature. After an experience of eight years on the Pacific Coast I am satisfied that English companies and individual capitalists have greatly erred, and shown a want of due business caution in their first purchase and management of property in the States. Their agents have too often allowed themselves to be led blindly along by the vendors and their agents. Had Mr. Streeter gone in the first instance to such professional gentlemen as Mr. J. D. Hague, or Mr. Wm. Ashburner, or Mr. A. Bowie, of San Francisco, for advice and general assistance in securing the property, he would never have been so foolish as to have accepted the property under the conditions then offered. The gentlemen I have named I know of my own knowledge to be thoroughly competent, painstaking, and honest, and intimately acquainted with the mining properties, pursuits, and requirements on the Pacific Coast.

"A Retiring Shareholder" remarks on my having sold my shares. I sold my shares on July 17, before I had seen the *Eureka Sentinel* of June 27 last, and before that paper had reached London. I did so on information I had received from a source in Eureka, which I deemed reliable, that the Richmond bonanza was nearly exhausted, and that unless new ore bodies were developed there would not be enough ore to keep the three furnaces running over this month, that the furnaces needed repairs, and would be shut down very soon, that Mr. Rickard was no longer a free agent, and that the committee's report, with their recommendations, were considered by the management there as *ultra vires*. I am quite sure that no shareholder who had paid, as I had, 12*l.* 10*s.* for his shares would have held them on what he knew must be, sooner or later, a falling market.

Before publishing my letter I took care to communicate the facts to the members of the late committee, three of whom are directors, and to Mr. Vallance.—Aug. 21. R. M. BRERETON.

RICHMOND CONSOLIDATED MINING COMPANY.
TO THE SHAREHOLDERS.

SIRS.—Since the publication of Mr. Brereton's alarming letter in the *Mining Journal* and *Mining World* of Aug. 10, I have received numerous letters and calls from shareholders, some asking me to say if the facts are really as stated in Mr. Brereton's letter, and if so what course I would advise in order to rescue the property; others asking if I would advise them to sell their shares; others enquiring if I would recommend them to buy; some write saying they recently purchased shares at 12*l.* 10*s.* on representations that they were worth 25*l.*, and cannot understand why they should so soon after drop to 8*l.*; others ask me point-blank if I consider "those who have set in authority over us are honest men or rogues." It is impossible for me to reply separately to all these enquiries, but it is due to those who have written for information, and also to the many shareholders who entrusted me with their proxies for the late meetings, that they should be informed of the efforts I have made to induce the directors to clear up the atmosphere of doubt which now unfortunately exists as to whether the English shareholders really have a mining property or not. Shortly after Mr. Brereton made the discovery as to Mr. Probert's evidence in the Eureka suit he showed me the notes, and said he considered it was his duty to state the facts in a letter to the shareholders. I strongly advised him against the adoption of such a course, urging him in the first instance to communicate the facts to the directors and see what reply they could give. A fortnight having elapsed, I thought Mr. Brereton had acted upon my advice, but on finding his letter in the *Mining Journal* of the 10th inst., I considered it my duty to communicate with the board; and, as will be seen from the annexed correspondence, the board do not feel in a position to make any reply.

The correspondence with the directors will repay a very careful perusal. Nothing could appear more satisfactory than the secretary's letter to me, dated Aug. 13, and nothing more unsatisfactory than his next letter, dated Aug. 15, for it appears there is always some reason found for withholding information, and for keeping shareholders "groping in the dark" when it is desirable they should have a few rays of light, to show them clearly the position of their affairs. Since the receipt of the secretary's last letter I have been engaged trying to "bottom" this business. The result is, there is no doubt whatever, that at the present time neither the London board nor English shareholders have the slightest legal power or control over what we have hitherto considered as our property, and as matters now stand, if unfortunately any difference should arise between the London company and the trustees of the Nevada company, the London company and English shareholders will be found absolutely powerless, and must inevitably "go to the wall," for we are bound hand and foot. All our property is absolutely in the hands of Mr. Probert and two others acting with him as trustees of the Nevada company, and their power to work good or evil is limited only by their own will. This undesirable state of affairs can only be altered by the London company getting back as soon as they can a reconveyance of the property from the trustees of the Nevada company. I find that long ago the company's eminent counsel, Mr. Benjamin, Q.C., advised the directors to get an Act from the Legislature of Nevada, the effect of which would have been to place the property for all time under the control of the English shareholders, instead of leaving it, as it is at this moment, in the absolute control of three American citizens. Why was not this sage advice and prudent counsel adopted? The directors, who failed to act upon this advice, may yet have to account to shareholders for the neglect. Be this as it may, until this legislative Act be obtained it is a perfect farce to have meetings of English shareholders to vote on questions of reform in the administration at Nevada, when those in charge of that administration can, if so disposed, set our deliberations and decisions at defiance; and this, I am convinced, they have at the present time

the power of doing, and further, that they can do so and still keep strictly within the legal powers given to them by the London directors, and—in the opinion of those well qualified to judge—given most wisely and unnecessarily. I am not surprised that Mr. Brereton's Extracts of Evidence, given upon oath by the Rev. Edward Probert and Mr. Thomas Wren in February, 1877, has created alarm amongst the shareholders.

With the knowledge I have of facts the following points of the reported and published evidence are to me something more than alarming—they are astounding:—

Mr. Probert's Evidence upon oath is stated to be as follows:—

- 1.—The Richmond Consolidated Mining Company (Limited) is incorporated in England. I am a director of that company, as such director I have never transacted any business for it in Eureka.
- 2.—I never caused to be furnished vouchers of the expenditure of the workings at Eureka to the Richmond Consolidated Mining Company (Limited).
- 3.—I do not know that the money or the property of the Richmond Consolidated Mining Company (Limited) pays the expenses of the workings at Eureka.
- 4.—I do not allow that the English company own the property. I say that I do not know what property we have got here; the American company own all the property and work it.

It will be for Mr. Probert to explain these apparent discrepancies between the published account of his evidence and the facts as shown by records in the London office, and for the honour and reputation of Englishmen I sincerely hope and trust he will be able to do so. It is Mr. Probert's duty to explain; my duty is plainly to inform shareholders of the facts, and to abstain (for the present) from any comment thereon. Mr. Probert's evidence was given on Feb. 7, 1877, and between Feb. 1 and 9, he sent the four following cablegrams to the late Mr. Hall, the then secretary, urging the reconveyance of the property from the English company to the American company:—

"Feb. 1, 1877.—Hearing commenced to day—opponent's case weak—Wren confident—Corrigan one of opponent's witnesses—reconvey immediately—important."
"Feb. 5, 1877.—Is property reconveyed?"
"Feb. 7, 1877.—Reconvey immediately—important—reply—suit favourable so far."

"Feb. 9, 1877.—Opponents having sued London Company by mistake, endeavouring to get suit dismissed on plea of wrong defendants, but delay in reconveying jeopardises everything."

It appears that on Feb. 9 Judge Cole did decide the case in favour of the London company, and dismissed the suit on the evidence that the property was held by the American company, and not by the English company. On Feb. 20, 1877, a deed of reconveyance of the property from the English company to the American company was executed, the seal of the English company affixed thereto, and the signatures of the English directors attested at the American Consulate. As regards Mr. Wren's evidence, we all know the fact that patents in Nevada are obtained with money which, if it were not so spent and applied, would be received as dividends by English shareholders, and therefore I regard such patents as the property of English shareholders, and, this being so, it is not reassuring to find Mr. Wren (another of the trustees) saying also upon oath—"If the other patents were obtained it would not be a breach of trust if they were not conveyed to the English company at their request." If such a refusal to convey to a property for which we have paid would not be a breach of trust according to American law, I ask what security English shareholders have for their property? And further, is it not time to change our investments from American to English soil? For myself, I can answer and decide, and my decision is now finally taken.

It is not known to the shareholders generally, but it is known to about 20 of the largest shareholders, who met the directors of the company, their solicitor, and myself, at the Westminster Palace Hotel, on April 18, 1877, that I commenced working nearly two years ago, with the hope of placing the administration of the company's affairs on a better footing, and of stamping out the causes which appeared to contribute to that wild speculation, which has been one of the curses of this company. I have held steadily to my shares through all the variations of price, ranging up and down between 3s. 10s. to 14s. and I have done this, not from any confidence in the management, but because I have always had unbounded faith in the mine, but now I find it very doubtful if we, as English shareholders, have a mine! I find a mere shadow where I thought we had a substantial property.

In ignorance of this I have been working continuously in opposition to the advice of my medical adviser, and at great personal sacrifice of comfort and convenience; it is "the last straw that breaks the camel's back," and in the present position of affairs, and the directors having placed all controlling power virtually in the hands of Mr. Probert, I have neither heart nor strength to make further efforts against such a combination of unwarlike circumstances, and have decided to sell my shares and to withdraw from all further active participation in Richmond affairs. The work and anxiety of the past nine months has nearly killed the Chairman, and I very much regret to say he is still very ill and incapacitated for business. I have long felt that it was endangering my own health, and it is due to others that I should take care neither future work or anxiety of Richmond business should lay me on a bed of sickness. I do not like to relinquish an unfinished task, it is intensely mortifying to me to do so, but the case appears to me hopeless, and really there is no encouragement to continue it. "A straw shows which way the wind blows," and I observe from the register that Mr. Edward Bower, the director who retired from office a few weeks ago, has since sold all his shares except four. He has been a director from the first, and was a "first director," and if he, with his intimate knowledge of the company's affairs, does not think it wise and prudent to hold more than four shares in the company it may prove prudent on my part to follow his example. I shall, however, retain 10 shares to entitle me to a copy of Mr. Probert's defence, also to be present at the shareholders meeting when Mr. Probert appears, and further to enable me to record a vote in his favour if his defence should prove that he is fairly entitled to the confidence of the shareholders, and if not then to satisfy my conscience by recording my vote against him and his past management.

Victoria-street, Westminster, Aug. 21.

CORRESPONDENCE WITH THE DIRECTORS.

Victoria-street, Westminster, August 13, 1878.

To the Directors of the Richmond Consolidated Mining Company.
GENTLEMEN, I beg to call your earnest attention to a letter signed "R. M. Brereton," which appeared in the Mining Journal and Mining World on Saturday, the 10th inst. I think the publication of that letter ill-advised, especially at a period when the chairman of the company is not able to attend to business, and I think, further, it would have been more judicious had Mr. Brereton, as an individual shareholder, in the first instance called the attention of the directors to the discovery he had made, and asked them for an explanation; and if the explanation proved unsatisfactory it would then, in my opinion, have been quite time enough to communicate with the shareholders. The publication has, however, been made, and the effect upon my mind is to create great doubt and misgiving as to the safety of our property, and this feeling of disquietude will doubtless be shared by the shareholders at large. I cannot believe it possible that the directors have placed the property in such an unstable and doubtful position as that indicated by Mr. Probert's evidence, and, if they have not done so, I suggest that a circular should forthwith be issued to shareholders to reassure them on the point, and so prevent them parting with their shares under the influence of panic and fear as to the safety of the property. If the property be in the condition indicated by Mr. Brereton's letter, then without doubt it is the duty of the directors, without a moment's delay, to take whatever steps are necessary to place the property actually (if not nominally) under the absolute control of the London board. I make these suggestions not only in my own interests, but on behalf of other shareholders, and I must ask you to acknowledge the receipt of this letter, and to inform me if the facts are as stated in Mr. Probert's evidence, and, if not, whether you feel in a position to issue forthwith some reassuring circular to the shareholders on the subject, and will do so.—I am, gentlemen, yours truly,
JOHN BAYLIS.

The Richmond Consolidated Mining Company, August 13.

To John Baylis, Esq.
DEAR SIR, I am directed to acknowledge the receipt of yours of this day, and to state that the board have consulted with Mr. Vallance on the matter, and instructed him to prepare a reply to Mr. Brereton's letter, and the board will meet again on Thursday to approve of the reply. I may state that the reply will be perfectly reassuring, and there is no reason to feel alarmed at any of the points raised by Mr. Brereton.—Yours faithfully,
HUBERT AKERS,
Secretary pro tem.

Victoria-street, August 14.

To Mr. Hubert Akers, Secretary, Richmond Consolidated Mining Company.
DEAR SIR, Thanks for your letter of yesterday's date. I am glad to find the board have instructed Mr. Vallance to prepare a reply to Mr. Brereton's letter, and also to hear "that the reply will be perfectly reassuring, and there is no reason to feel great alarm at any of the points raised by Mr. Brereton." I must confess to having felt great alarm, and shall wait anxiously for the reply, which I presume may be expected on Friday.—Yours faithfully,
JOHN BAYLIS.

The Richmond Consolidated Mining Company August 15.

To John Baylis, Esq.
DEAR SIR, Referring to mine of the 13th with reference to Mr. Brereton's letter in the mining papers of last Saturday, I have now to inform you that the board met this afternoon, and Mr. Vallance attended, and reported that he had consulted with Mr. Barber, who advised that, considering the circumstances in which the company was placed at present with regard to the law proceedings, it would not be wise to publish a reply.—Yours faithfully,
HUBERT AKERS,
Secretary pro tem.

RICHMOND MINING COMPANY.

SIR, A "Retiring Shareholder" asks—Have we got a mine? Why, certainly we have; the fact of its being held in trust for us is a matter of but very small importance. Mr. Brereton has not sold his shares on this account, but because we have a mine which, according to the report in last week's Journal, has fallen off in every end and stoppage but one, and which, I consider, has been worked

unfairly and recklessly during the past six months. The furnaces will be shut down at the end of the month; the reason, I am informed, is not so much the want of repairs to them as the decreased supply of ore to keep them going. The mine is now selling for \$2275,000, and according to the agent's report this is at least double what it is worth.

ANOTHER RETIRING SHAREHOLDER.

THE PORT PHILLIP GOLD COMPANY.

SIR, I have just seen the letter of "A Large Shareholder" which appeared in the Journal of July 20. I do not agree with your correspondent that the cause of the low price of the shares is attributable to the meagreness of the reports published, because I feel sure that by reading regularly these reports, containing as they do statements of the number of tons crushed, the quantity of gold obtained, the average yield per ton; how much of the gold yielded was got by the tributers, and how much by the company, and the receipts and disbursements, any shareholder can form a good idea of the condition from month to month of the property. Besides, the advice from which these results are taken can always be seen at the office, and they are expressed in a clear and readily to be comprehended style.

In my opinion there are three distinct causes which combine to depress the shares:—1. That the management must be deficient in energy and mining skill, having, while working the upper parts of the mine, failed to find the quartz which the tributers came in and found directly. Some three years ago there was a letter from the manager stating that the mine might soon have to stop; directly after which men who knew better came in as tributers, and immediately pounced down upon thousands of tons of good quartz, which they could find for themselves, but which the manager apparently could not find for the company. If the company had been equal to getting this quartz out by men at wages under the manager's directions, the profit which has already gone and is still going into the pockets of the tributers would have gone, and be now going, in augmentation of dividends.—2. That the clearing out of the upper part and middle of the mine through the tributers' operations is going on rather rapidly, so that such profit as the tributing gives to the company cannot in the nature of things be regarded as altogether permanent, while the explorations now being made by the company in depth have not as yet resulted in any good discovery. It was expected that the lodes which got poorer in the lower levels would improve in the lowest levels after passing through "a poor band"; so they may, but it has not hitherto been discovered. Should the expectation be realised some improvement in the shares may be expected, unless, indeed, in order to realise it these levels also have to be surrendered to tributers, which, as I have heard, though I cannot vouch for it, that the manager is over three score years and ten, and never goes down the mine, is not an improbable event.—3. That the management is too expensive. It will scarcely be credited, though it is an undoubted fact, that the manager is actually paid twice over. The Clunes Company furnishes the mine, the Port Phillip Company the machinery, and the profit of these united operations and the tributing is divided, 7-20ths to the Clunes, and 13-20ths to the Port Phillip.

Well, before this division of profits the manager has a salary of 800*l.* a year, and then out of the 13-20ths he is paid over again—600*l.* a year for salary and house rent. Having been paid 800*l.* for managing the mining operations, for what, I would ask, is he paid this second salary of 600*l.* a year? and what is it but a complete incubus upon the 13-20ths of the profit belonging to the Port Phillip? Again, the directors in London are paid a great deal too much. There are five of them, and the fees are 500*l.* a year. Now, there are thirteen boards a year, one upon the arrival of every four weeks' mail, which gives a cost to the shareholders of no less than 38*l.* 9s. 2d. for every board meeting. Supposing every one of the directors to attend every board, that would give a fee of 7*l.* 13s. 10d. to each director for his single attendance. If I only knew how long the meetings last I would calculate how much this would come to per minute; it would be curious, and I expect rather startling. I think that if the Australian management were put into the hands of a younger and more energetic man, and no salary paid to him out of the Port Phillip's share of the profit, and the directors' fees were put upon a proper scale commensurate with the duties to be performed, complaints of the low price of Port Phillip shares would soon cease to be heard.

As to your correspondent's suggestion of having new blood in the direction I cannot see that that is actually needed, because any honest man acquainted with the rules of addition, subtraction, and division of money could effectively perform the duties; and now that the time is at hand when the reign of excessive fees must come to an end, the present directors, provided they will be content with reasonable remuneration, are as suitable as any others would be.

FAIR DAY'S WORK FOR FAIR DAY'S WAGE.

THE MINERAL RESOURCES OF BRITISH COLUMBIA.

SIR, As British Columbia as a mining country is but little known in England, I will ask for a small space in your valuable Journal to inform your readers of its wealth as a mineral country. Some sixteen months ago the Government of British Columbia communicated with Mr. Wm. Lane Booker, Her Majesty's consul at San Francisco, asking him to recommend to the Government a mining engineer. I was appointed to fill the position. On my arrival at Victoria I was first ordered to Howe Sound, to report on a copper lode which had never been reported on by anyone acquainted with mining. I found a well-defined lode, its direction being east and west, about 3 ft. in width. From where I stood I could see the lode a vertical depth of 400 ft., and about 1500 ft. in length. I never saw richer ore on this coast or in England. Three samples were taken to assay—No. 1 gave 395.67 in silver and 58 per cent. copper per ton; No. 2 gave 343.98 in silver and 52 per cent. copper; No. 3 gave 223.56 in silver and 15 per cent. copper. The formation is granite. The mine being only three miles from the salt water the ore can be transported to Swansea at an expense of only 35 per cent. A company was formed at Victoria to develop the mine; it improves in richness as work progresses, and will likely prove of great value. Sixty miles north, on the Fraser river, near a little town called Hope, there are rich silver mines. I have not had the opportunity to visit these mines, but the ore I saw is very rich, assaying from 102 to 500 per ton. A company at San Francisco intend to purchase these mines. About 200 miles north-west are the Cherry Creek Mines; there is considerable rich ore on the surface, but the work done is not sufficient to prove whether there is a vein or not. Forty miles north of this place we come into a slate formation, which is also a mineral belt, but changes from silver to gold. The alluvial mining has been the richest on the face of the globe. Cariboo district has added much to the wealth of the world: \$44,000,000 in glittering dust has been taken away. Williams' Creek has proved the richest creek in the district. Quartz was not noticed at that time, the people thought they would always have rich diggings, and miners spent their money freely, but the day has arrived, as it did in California and Australia, when quartz will have to be worked to sustain the country. The British Columbians did not prepare to meet a rainy day; they are like Lazarus, they are glad to take whatever they can get. A short time ago a company, called the Cariboo Quartz Mining Company, was formed to work quartz on Williams' Creek, on what is known as the Big Bonanza ledge. This ledge was traced three miles in length. This company run a tunnel 150 ft., striking the ledge at a vertical depth of 52 ft., and in width 22 ft. Assays of rock from this depth were from 10 to 150 per ton. A winze has been sunk 57 ft., exposing the ledge to the bottom, where a cross-cut was run, striking the hanging and foot walls, showing the ledge the same width as shown in the tunnel above, but the company were obliged to suspend operations for the lack of funds. Another company was formed at Victoria, called the British Columbia Milling and Mining Company. This company owns the adjoining ground on each side of the Cariboo Company; they have run two tunnels, one has intersected the ledge, finding the same characteristic ore as that in the Cariboo; the other tunnel has 200 ft. more to run before intersecting the ledge. This company purchased a 20-stamps mill at San Francisco last March,

and for the lack of funds they also were obliged to suspend operations. Neither the mill can be erected nor the mines developed.

In the district there is a four-stamps mill working, crushing ore for the miners; the quartz milled from \$9 to \$16 per ton. British Columbia is in need of capital to develop the mines, and men of experience in milling and mining quartz; then this country could be ranked with California and Australia. It will give employment to thousands of unemployed miners, and capital will realise a large percentage. Unless English capital is invested the interior country will fall again into the hands of the Hudson Bay Company. People came here in 1858, when quartz mining and milling was but little known. They are twenty years behind the age, the country wants new blood; then, and not until then, will British Columbia be a success and an honour to the British flag. R. B. HARPER, Barkerville, B.C., July 20. Government Mining Engineer.

BRITISH ENTERPRISE IN SWEDEN—HULTAFALL MINES.

SIR, Having just returned from a visit to the Hultafall Mines, in Sweden, and as many of your readers are interested in the property, I shall be glad if you would insert the following particulars in regard to their position and prospects:—

I devoted three days to the examination of the mines and works. At present horse labour is being employed at the mines, but a steam-engine and boilers have been erected, and will be in a position to commence work in about a week from the present time, which will work the stone breaker and draw the mineral and water from the mines. The whole of the work is of the most satisfactory character, being constructed in a very substantial and permanent manner, capable of sinking the mines for some years to come, certainly to the present depth of the Vieille Montagne Company's mines. These latter have been in operation for upwards of 20 years. The levels east and west in the 15 fm. level have been driven about 200 ft., mostly in a good course of ore, and laying open a very rich lode. A cross cut has been put in to test the width of the lode about 5 fms. behind the present western end, where it is found to be 13 ft. wide, and worth about 40 tons of lead and blende for the width of the lode. No stopping whatever has been done in the mines. The shaft has been sunk 25 fms., and at this depth a cross-cut has been put out to the lode, and at the time of my visit two pairs of men had been put on to drive east and west on the lode, which is developing similar characteristics to those of the level above.

The Vieille Montagne Company are working to the east, west, and south; or, in other words, on three sides of the Hultafall Company's property, and the prospects of the latter proving a success are certainly favourable. A group of rich mines to the east, partially owned by the Vieille Montagne Company, are likely to fall into the possession of the Hultafall Company, but the negotiations now pending are of a delicate nature, and more cannot at present be said, except that great importance is attached to this contingency. The value of this district can hardly be over-estimated, but it has up to the present been entirely monopolised by the Vieille Montagne Company. The Hultafall Company have, however, obtained already a considerable footing, and in the course of a reasonable time it is likely to assume an important position.

The road from the mines to the dressing-floors has been put in good order, and about 1000 tons of ore have been carted over. There is no difficulty whatever in getting the ores transported, though by and bye a saving could be effected by putting down a tramway. The season has been an exceedingly dry one. When I was there the Vieille Montagne Company were threatened with partial stoppage from the low state of the water, though they have paid, it is said, 60,000*l.* for the lake and water rights.

At Hultafall the machinery was actually stopped, and had been for several weeks, not but what there was plenty of water in the lakes, but the water level had sunk too low to drive the machinery by which the dressing is carried on. This difficulty is at once seen to be merely temporary. A pump has been ordered which will be worked by the steam-engine, and at little or no increased cost. Thus, if the same contingency again arises, a never-failing supply of water will be available even in the driest seasons.

The buildings covering in the entire dressing-floors have been completed; they are of the most perfect kind, heated with hot water pipes, and enabling dressing operations to be carried on all the year. The steam-engine, boiler, crushers, jiggers, and buddles are under the same roof, and are the most compact to be found at any dressing-floors in the kingdom. There are now ready 20 tons of lead and 50 tons of blende. For next month the agent estimates his returns at—

Lead 25 tons
Blende 100 "

For October—

Lead 50 "
Blende 200 "

He says the same will be continued during the winter months and until the end of March, when by a small outlay in the shape of four or five additional jiggers and the same number of buddles, the returns can be doubled.

The working cost at the mines and dressing-floors, including the carriage of mineral and expenses of every kind, are covered by a monthly outlay of 500*l.*, so that it will be seen that the prospects of the company are very good. The machinery for these mines was ordered in the autumn of last year, and was dispatched prior to the close of the navigation, so that the agent had the advantage of the winter for its erection.

There has been much to learn, and there have been difficulties and expenses in mastering the business, but these difficulties are either all overcome or in course of being overcome. The foundation which the company has to build upon is one of undoubted stability, as the mines are themselves so rich. G. BATTERS, Austinfriars, Aug. 19.

BRITISH ENTERPRISE IN CYPRUS.

SIR, The acquisition of Cyprus by Great Britain has been very generally regarded as opening out a new and attractive field for the employment of capital, and it cannot be doubted that by the exercise of judgment in the selection of the investment, and in the avoidance of second-hand purchases through those who deal on the principle of the Anglo-American vendors, and relying upon the one transaction yielding them a competency, care nothing about the probability of the capitalists receiving interest for their money or whether failure of the project inflicts irreparable injury upon the district with which it is connected. The method of procedure has many times been exposed, yet capitalists are still to be found who are credulous enough to part with their money, yet too unmanly to admit that their subsequent loss is the result of their own folly. The process is simple, if not creditable, and cannot be too thoroughly understood. The real owner of the property offers it for sale at a fair price, or perhaps at an advance of 50 per cent. or so for his trouble in coming to England to negotiate the sale, so that a property intrinsically worth 10,000*l.* could frequently be obtained even in London for 15,000*l.*; but, unfortunately, it almost invariably passes through the hands of an English middleman before it is brought under the notice of the capitalist.

Assuming the property to look attractive, the middleman unhesitatingly offers the 15,000*l.* cash down for it, but upon the condition that a formal receipt shall be given for 150,000*l.*, and it is on this that a fictitious receipt that the property is offered to the public. It is not in every case that the middleman is so conscientious as here indicated, for less than two years since a Canadian of great respectability offered a mining property which would, doubtless, have yielded handsome returns on the price asked for it—15,000*l.*; but after attempting to negotiate with various promoters, several of whom offered him bank notes for the amount, but upon the condition that he should sign a receipt for 300,000*l.*, 200,000*l.*, 150,000*l.*, he was compelled to return without effecting a sale. The property remains unworked, and the gentleman's death was noticed in the Journal only a few weeks since. Beyond allowing a commission of 10 per cent. out of the 15,000*l.*, the vendor would make no concession, whatever, remarking that as he had a reputation in the province, and several other properties which would sell at increasing prices as each one sold should be developed, it would not even pay commercially to spoil the market on one transaction, even if honour

and honesty were left out of the question. It is this class of transaction that must be avoided in connection with Cyprus, for the fact must not be ignored that, although in this particular case no business was done, it was only a small percentage of the purchase-money paid by the public which left this country in the case of the Emma, Flagstaff, Ruby, Exchequer, and the various other Anglo-American concerns which are, or have been, on the English market.

But it must not be supposed that the promoters pocket these differences, for frequently they receive but a small commission, considering the dirty work they have to do, and the obloquy heaped upon them. A large proportion of the difference is distributed among the directors either in the form of payments for qualifying, presents, or in some other way, so as to evade the law, and thus avoid punishment for conspiracy or fraud. If this principle be abolished in connection with Cyprus undertakings there will be no difficulty in raising funds and in realising profits from the working of the mines.

That the attractions and capabilities of Cyprus have been much exaggerated I admit; but, on the other hand, there are not the difficulties to be encountered which the enemies of the island have mentioned. There is a very good port on the north side of the island, and although Famagosta is at present in a very dilapidated condition as regards harbour accommodation, the restoration of the old pier and the construction of a good breakwater would give an excellent harbour. With regard to the mines I do not anticipate that they will ever turn out sufficient mineral to injure the market, as the Chilian copper mines and the Australian tin mines have done, but there is an abundant field for remunerative enterprise. Near Bapho, for example, there are excellent copper deposits, and if asbestos be a mineral that can readily be sold it can also be obtained in large quantities and of splendid quality in the same locality. Amber and copper can also be obtained near Larnaca, and I should think that all minerals could be cheaply carried to England in the cotton ships, as they are carried in the wool ships from Australia. The Cyprus cotton is of good quality from American seed, and tobacco and madder are also produced, but the trade in these could be largely developed. The salt lakes are large and lucrative, but are Government property, the salt trade being a State monopoly.—*Lemasol, Aug. 4.* CORNUBIENSIS.

RECENT ORIGIN OF MINERAL LODES AND DEPOSITS OF METALLIC MINERALS.

SIR,—We have seen attempts to account for the formation of mineral lodes by supposing them to have been originally cracks in the rock, produced by the general cooling of the earth, and consequent contraction thereof;—these lines, or fissures, splitting up the earth into wedge-like pieces, enabling its crust to contract upon an ever-diminishing nucleus, and afterwards becoming filled with metallic minerals, in some way or other not easily understood. Now, without any intention of arguing about the older fissures, I have thought that the formation of mineral lodes and irregular deposits of metallic minerals may partly be due to the expansion of the surrounding rocks. In looking over any mining district where there are veins or deposits of metallic minerals we find the contour of the surface is always the result of denudation. This denudation has at some distant period gone on, perhaps, for countless ages, until in some cases miles upon miles of solid rocks, formerly resting upon the present surfaces, have been removed. Now, the rocks we see before us to-day, having been at some former time at great depths—consequently, under great pressure—having been gradually relieved from that pressure, and the greater heat consequent thereon, have as gradually expanded and cooled on rising nearer the surface as the destruction of the superincumbent rocks proceeded.

This gradual expansion would open many old fissures, and perhaps produce many cracks and cavities more—the widening of which might, of course, be very slow. Through these fissures and into these cavities the excessively hot water and, perhaps, gases, hitherto pent-up at great depths, would percolate. These excessive hot waters and gases would contain many minerals in solution, and rapidly losing their intense heat, being thereby unable longer to retain these minerals in solution would deposit them in the fissures and cavities—thus forming mineral lodes and deposits.

If this view be correct, then it follows that the lodes of metallic minerals and mineral deposits generally have been formed quite recently, when compared to the ages of the rocks in which they are contained—and I think this can be shown to be so. In looking for the finest and most perfect mineral crystals experience teaches us to look within a moderate depth from the surface, where the rocks have had room to expand, leaving cavities where such crystals can grow, which we do not so generally find as we descend into the deeper mines. Now, the difference between our shallowest and deepest mines is as nothing when compared to the vast depth of rock which has in some cases been removed by countless ages of denudation from the top of our metallic mines. Hence, had the metallic minerals been deposited while the rocks were under this pressure we should not have found any appreciable difference between the crystals from near the surface and from greater depths. It is clear that the mineral crystals generally adorning our cabinets have not been developed under great pressure, neither have they been subjected to great pressure since their first birth in their present form. It is equally clear that the rocks which surrounded these crystals, and in which they grew, bear evidence of having sustained at some period very great pressure indeed—hence the metallic minerals have been deposited in their present positions since that pressure has been removed.

The disruptions of the rocks arising from expansion might be expected to conform more or less with the strike of the elvans and other eruptive rocks which had penetrated the strata, while under pressure, as there might be expected, conditions favouring fresh disruptions along the line of these penetrating rocks. Accordingly we find that in many instances the mineral lodes actually conform for considerable distances with the strike of the elvans and greenstones in most of the mining districts.

These views would not be favourable to the majority of mineral lodes continuing largely productive to very remarkable depths—for disruptions from expansion would not be generally broader at great depths than nearer the surface, where the expansion of the rocks would be greater. Except in those instances where the disruptions had branched off from one opening into two or more, and sometimes many on approaching the surface. In such cases, after the openings had been filled with mineral, the branches would appear to an observer approaching or exploring them from the surface as converging in depth, and the lode would appear to increase in breadth at every point of convergence, or rather at every junction—consequently becoming larger and more productive as it went down. This would be the case until the last of the converging branches had been passed, when a contraction, sometimes gradual and at other times very rapid, would ensue. I believe that this has been the experience of most observers of mineral lodes with regard to many of those lodes, and probably would be with many more of them on their being a little further explored; and, this being so, we must not look for productive mines down in those sub-lime depths which some people have been preaching of late. Although some of our mines are richly productive to (say) nearly 400 fms., and may go down all right further still, even they must become unbottomed at no very great depth if our theory be correct; and to talk of a richer zone below of 500 fms. after the top 500 fms. shall have become exhausted, if not moonshine, appears more likely to end in a vision and a dream than ever to become sober reality.

Now that mining enterprise has been kept for so long a time in abeyance, consequent on the bad state of trade, over production of the metals, &c., many lessons have been learnt, improvements introduced, abuses swept away, inferior mines succumbed, and the deeper mines are being rapidly scooped out in order to keep up the steam necessary for keeping them going. Trade is not likely always to remain in a bad state, and over-production of the metals always works its own cure from the rapid exhaustion of the over-producing mines. Hence all these things tend towards a violent reaction, and on a general improvement in trade metallic mining is sure once more to come to the front with its wonted elasticity. Let us, then, when that time arrives guard against buying gold too dear—against

sinking money in mines already too deep to give any return. Let us leave the deeper zones alone for speculative study to those who choose to speculate on what may be, without being likely to go down there themselves to see what is. We shall find mineral ground enough sufficiently fruitful within a moderate depth below the surface of the earth to supply the requirements of the world without incurring greater risks in searching for the metals than can be more than counterbalanced by the profits of their production.

To secure this we must economically keep to all the improvements introduced in working, and that can be introduced—but of infinitely greater importance is judicious selection. If the views put forth in this paper be correct that deposits of metallic minerals as we now find them are of recent origin, and for the reasons here assigned, then on their general acceptance the chances of unsuccessful mining operations become fewer, as we cast off all notions of taking up old deep and expensive mines for resuscitation. This discarding of old deep mines is no new thought, for similar views have been advocated before; but always, so far as I have seen, without any sufficient reason being assigned for such views. Without sufficient reasons being advanced against a particular course you will find that course to be often pursued by men who, although open to sound argument, are deeply opposed to receiving dogmatic assertion. Such men may on very fair apparent grounds be sometimes led to follow a course which under clearer light they would not have chosen.

I have given you some of my reasons for believing that metallic deposits as well as lodes as we now find them are of recent origin. If my views are correct we are then on the track of learning something more about them; and, if my views are not correct, I trust that some of your many able correspondents will show me their fallacy.—*Redruth, Aug. 21.* WM. TREGAY.

ROCK-BORING MACHINERY—SCHRAM'S DRILL.

SIR,—As "Delta" did not care to respond to my invitation in your issue of Aug. 10 to give his real name, allow me through the medium of your valuable Journal to prove the incorrectness of the statements made in his attack upon me in the *Mining Journal* of Aug. 3. Mr. "Delta" must excuse me if in the following remarks I only refer to him as Mr. D., as when I write in English I like to employ English terms. After writing my provisional specification I learnt that Mr. Crease had formerly taken out a patent for a rock-drill on the direct-acting system, and when I wrote my final specification I mentioned this fact and only claimed the construction of a machine as I have constructed it, not as Mr. Crease has it, because a machine made after his drawing would not work. That is, I claimed the construction of a machine which I, in the course of many practical experiments, had found to be of real value. Having afterwards found that there was another rock drill on the direct-acting system constructed by Mr. Edwards, I bought his patent because his idea of an automatic feed was good. However, Mr. Edwards' machine did not work properly, the recoil of the slide-piston preventing the proper opening and closing of the slide, and as my construction has beyond doubt proved itself to be the best, I prefer to retain it. Mr. D. says "the Schram ore-compressor direct-acting was made in England nearly 30 years ago, and somewhat extensively employed as an exhaust-pump at Millwall." Whether a construction somewhat similar to my air-compressor was used 30 years ago as an exhaust-pump I do not know, but will take Mr. D.'s word for it; however, my air compressor is not an exhaust-pump. If, as Mr. D. says, it has been "somewhat extensively employed," this only proves that the idea must be good which practical trials lately made with my air-compressor at the works of Messrs. Oliver and Co. (Limited), of Chesterfield, have also proved. However, when Mr. D. wrote his criticising letter he had never seen any of my air-compressors, and knew nothing about the details of my construction.

If one were to criticise any steam-engine or pump in the same spirit as Mr. D. criticises my construction one may as well at once say James Watt is the constructor of them all, as he was the first to use a steam-cylinder and a double-acting piston. But as such an argument would be absurd to any fair-thinking mind I shall go on making all the improvements I possibly can, as they may prove good to the public at large.

Zwick's work on "Tunnelling," to which Mr. D. refers, I have not been able to find either in the British Museum or in other libraries where I have enquired for it. However, the construction of my carriage support is the result of many years' practical experience in tunnelling and level driving. Numerous are the constructions I have made, and many of them have been practically carried out, and all the improvements I have made in this kind of support have gradually led to the one described in "The Application of Machine Power in Rock Drilling."

It is possible that Mr. Darlington has tried a support for shaft sinking, in which the principle has been similar to the one, for certain cases, constructed by me; but although I have never had an opportunity of seeing his support, I very much doubt that the construction is the same, as this would be a very remarkable coincidence indeed.

In his very great desire to find fault with a machine which, to judge from his false remarks, he has very likely never seen at work, Mr. D. very much contradicts himself. He says "the blows must frequently strike the back cover and front gland, particularly if the pressure fluid should be high—a trick disagreeably bad and dangerous." And again, "the result is a feeble, vacillating, or a kind of sham blow." If the machine gives merely a "sham blow," what fear is there of the piston striking the back cover or front gland? In paragraph 2 he admits that "the air is not worked expansively," consequently there is full pressure on the back of the piston; but in paragraph 3 he says "there is no pressure whatever on the back of the piston." Every engineer will at once see the worthlessness of these contradictory statements.

But let us now see if there is any truth whatever in Mr. D.'s assertions, which it will seem Mr. D. has found applicable to Crease's machine.

"1.—The piston will and must frequently strike the back cover and front gland, particularly if the pressure fluid should be high—a trick disagreeably bad and dangerous."

In the Dalkarlsberg Mine, in Sweden, my machine was introduced for the purpose of driving a heading in a place where, in consequence of the hardness of the rock, the work had been abandoned by the hand labourer, and for several fathoms from the face the roof had been kept lower and lower, so that when the work with my machines commenced all the holes had to be directed upwards in the roof, in order to give proper height for the carriage support, which, by the way, was of a different construction to the one described in my pamphlet. During the whole of this operation, when all the holes were directed considerably more upwards than is necessary in ordinary level driving, the piston never struck the back cover. In consequence of the great force of each forward stroke the piston would naturally strike the front gland were the machine put in the hands of careless or malicious workmen, who did not feel the machine so as to allow the drill point to strike against the rock; but I have provided even for these cases (see the "Application of Machine-Power in Rock Drilling," p. 12), and unlike most other rock-drills I have (besides the air cushion formed between the lower inlet and the front gland) a wrought-iron ring and an india-rubber washer to diminish the force of the blow. As one among many witnesses to the truth of what I have here stated, I may mention Mr. Gustaf Bratt, Managing Director of the Dalkarlsberg Mines.

"2.—The air is not worked expansively, consequently the consumption of compressed air must be at least the cubic contents of a stroke multiplied by the number of strokes made per minute. It is remarkably small consumption of air or steam is, therefore, a bare assertion, and not a bare fact."

This sounds very fine, but proves how very little Mr. D. knows or understands my machine. The stroke is a short though powerful one, because the piston works perfectly freely, and the motive fluid is utilised to its fullest extent. How I arrange my ports I do not care to instruct Mr. D. The fact is that I, through many carefully made experiments, have found the right position for the

ports, so as to reverse the slide at the right moment without any waste of motive fluid. In Levant du Flenu, by Mons, in Belgium, the following experiment, suggested by me, was made to find out the real consumption of compressed air by different rock-drills.

An air-receiver was filled with compressed air at 3½ atmospheres pressure, and the connection with the air-compressor being shut off holes (all of the same diameter) were bored with different machines (the air-receiver always filled to the same pressure before each new machine was started), allowing the pressure to sink till the machines could bore no more, when the holes were measured. The Dubois et Francis and the Dunn machines bored 1.20 metre and 1.30 metre respectively, and the Schram 4 metres. Among others, Mr. Charles Villiot, engineer to the Société de la Meuse, in Liège, and Mr. Mativa, engineer to the Société Levant du Flenu, were present.

In the Magpie Level, near Ashford, in Derbyshire, an Ingersoll rock-drill had been tried, and the air-compressor (driven by a turbine) could hardly keep it going; but the same air-compressor proved sufficient to drive two of my large machines simultaneously. These are facts which I am prepared to prove, and which speak more than Mr. D.'s "bare assertion."

"3.—The blow is obtained where there is no pressure whatever on the back of the piston, and when the full pressure is on the front of the piston to withdraw the tool. The result is, in spite of Mr. Schram's assertion a 'betwixt wind and water,' or a kind of sham blow."

Again Mr. D. proves his very great ignorance of the subject on which he is so very desirous to enlighten the public. Among the many proofs of the powerful blows of my machine it may be sufficient to give the following return by Mr. G. Bratt, member of the committee appointed by the Swedish Iron Institute (Jernkontoret) to report on trials with the best existing rock drills.

The trial took place in the gallery Vikern, in the iron mine Dalkarlsberg, Sweden. The rock was exceedingly hard corit.

Machine.	35 lbs. pressure.			45 lbs. pressure.			55 lbs. pressure.		
	Time.	Feet.	Lin. p.min.	Time.	Feet.	Lin. p.min.	Time.	Feet.	Lin. p.min.
Schram, wet.	m. sec.			m. sec.			m. sec.		
" dry.	22 50	3.29	14.5	10 15	2.90	29.30	14 40	4.85	33.06
Rand, wet.	39 24	3.06	7.7	20 30	2.06	11.0	—	—	—
" dry.	23 15	2.80	12.4	24 0	4.02	16.75	13 30	3.61	27.0
Ingersoll, wet	39 40	2.23	5.62	23 30	2.19	9.32	—	—	—
" dry	17 0	1.85	8.0	21 35	3.25	15.69	14 50	2.88	19.20
Burleigh, wet	Did not work	—	—	32 35	2.24	6.90	—	—	—
" dry	—	—	—	Worked badly	—	—	21 20	2.45	11.48

1 Swedish foot = 10 in.; 1 in. = 10 lines.

Here is an extract from a letter from Mr. Jahn, dated Müllerschacht, Liebau, Aug. 8, 1876, which I give in English:—

Fifth trial, Aug. 8, in rough sandstone. Schram's machine, No. 4. First hole horizontal; dry; in 35 minutes, 48½ in.; changing of drills, 5½ minutes; time for actual boring, 29½ minutes. Per minute inch 1.63
Second hole horizontal; dry; in 41 minutes, 46 in.; changing of drills, 6½ minutes; time of boring, 34½ minutes. Per minute inch 1.34
Third hole 5° upwards; dry; in 41 minutes, 53 in.; changing of drills, 5 minutes; time of boring, 36 minutes. Per minute inch 1.47
Darlington's Machine: First and last hole 3° upwards; dry; in 1 hour 48½ minutes, 50 in.; changing of drills, 13½ minutes; time of actual boring, 95 minutes. Per minute inch 0.5

JAHN, Betriebs-leiter.

In both these cases the machines worked under the same conditions, in the same rock, and with the same pressure.

If Mr. D. requires any more proofs of how very wrong he has been in his statements I am quite prepared to furnish them. With regard to Mr. Mahler, of Vienna, Mr. D. says—"Indeed, between these two gentlemen there would seem to be some understanding to praise and promote each other's interests." I think Mr. M. has a right to prefer my machines after satisfying himself that they are the best, particularly as these machines, after severe trials, have been adopted at the well-known mines at Pribram, in Bohemia, belonging to the Austrian Government, and elsewhere. As for myself, I have till now never, in print even, as much as mentioned Mr. M.'s name.

With regard to Mr. D.'s remark that some of my illustrations "are to be found in a tract by Mr. Mahler," it is natural that in Mr. M.'s description of my machine there should, as a matter of course, be some resemblance, since it was I who furnished him with the drawings of the machine; but all my illustrations are photo-lithographed from original drawings made by myself. Thus, even his remark on this point does not do Mr. D. any credit whatever.

Having now stated a few of the facts I have at my disposal, I leave it to the right-minded English public to judge between me and Mr. D.—*London, Aug. 21.* RICHARD SCHRAM.

* No. 4 was the number of the machine, which was of the smallest size. [Mr. Schram has shown us the several letters referred to in proof of the accuracy of his translation of them.]

SCHRAM'S CLAIMS.

SIR,—My attention has been called to certain inventions claimed by Mr. Richard Schram. The air compressor which he distinguishes with his name is precisely similar in constructive arrangements with many machines made 35 years ago for the Payne Patent Timber Preserving Company, with this difference in their application—the Payne machines were employed for exhausting and not for compressing air. The V-shaped wheel in the rock drill to which Mr. Schram has given his name is one of the many devices arranged by myself more than five years back. The twist bar to which Mr. Schram attaches the V-wheel, and which I also employed, was invented and applied at least fourteen years ago.

London, Aug. 19. J. KNOWLEDEN.

RAISING WATER FROM MINES.

SIR,—The importance of economy in raising water from mines is so great that the efforts of inventors to devise new machines for accomplishing the object in view have been almost innumerable; but the invention of Mr. Robert Dunn, of Wylam-on-Tyne, is of such a startling character that it ought not to be passed over without notice. We all know that many of the most simple inventions are the most efficient, and it may be so in this case, although it appears to me that in practice the raising of water from any great depth will be impossible, for it seems that either the distance between the bucket and the fixed valve would be too great, or else that there would be such a heavy column on the bucket that the valve therein would never open whilst making the down stroke.

Instead of a pump forcing or drawing through tubes, Mr. Dunn would make the pump itself 10 fms., 50 fms., or 100 fms. long, as the case might be, for he states that he proposes to employ a cylinder fitted together in as many lengths as required for the depth of the mine or pit, for example, in which cylinder there works a bucket attached to a rope or chain, which passes over a pulley or sheave, actuated by any convenient means. The bucket is balanced, in order to regulate the down stroke by adding weight to the bucket, so as to cause it to descend at a quicker rate. The up stroke can be regulated by the speed of the engine or other power which may be applied. The water on being lifted to the top of the cylinder overflows into a box placed a little below the top of the cylinder, or into a spout attached to the side of the cylinder, as may be required. By this arrangement a great saving is effected, as less power is required to lift the water than by the ordinary means, whilst spears and beam engines are dispensed with. Also there is less obstruction in the shaft, as the cylinder is straight, and may be fitted close to the side of the shaft, or fixed in a working shaft if required, without being an obstruction, as no risk is incurred of the breakage of spears. As, moreover, the bucket is weighted, in case of the rope or chain breaking, it would descend at the usual rate, and the broken rope or chain would descend into the cylinder without damaging the pit or shaft; and the weight can be regulated on the bucket so as to cause it to descend at a very slow rate if required.

One great advantage of Mr. Dunn's invention is that the ordinary winding-engine can be used for the new pump, so that when a few

hours' pumping per day will keep the water under, one engine would suffice for both winding and pumping. The apparatus can be worked by a winding-engine fitted with a drum, by a locomotive engine on a railway by a jack roll, or by any power where the rope or chain can be applied. It may be applied in any place where water is required to be lifted in factories or other works. If required in factories it may be used as a hydraulic power, or it may be used as a hydraulic power in mines or pits by attaching a cock or valve to the cylinder, and applying a pipe to the same. This apparatus is applied with facility, and readily repaired; when the bucket requires repairing it is drawn out of the cylinder, when if the clack is tight the column of water will be maintained. The clack can also be drawn up out of the cylinder, or it may be examined at a door which is provided in order to afford ready access to it. Straps or bridles are provided for the purpose of controlling the lift of the valve. In the case of a mine or pit being filled with water, the cylinder can be lowered into any depth, as required; if lowered to the bottom of the shaft, the full length of the shaft can be lifted at one stroke. The cylinders may be made of any size to suit the quantity of water required to be lifted.

By applying two or more cylinders, which may be worked by a stationary engine with drum and spur gear, or otherwise, one bucket will be ascending while the other is descending, whereby a constant flow may be kept up; when once the column of water is formed the stroke may be made of any required length, according to the quantity of water required to be lifted. It is preferred to employ a ball clack; the seat of the clack is formed with openings or gratings to allow the water or other liquid to flow through, and is concave, of the same radius as the ball; the ball is spherical, and may be made of india-rubber or any suitable material; the seat may also be faced with india-rubber or other suitable material to relieve the shock upon the ball falling upon the seat; by this arrangement the ball is not so liable to get out of order as is the case where it falls upon a mitred edge; this arrangement of ball valve and seat is also applicable to the bucket, and also generally wherever a bucket or clack is required. The joint of the cylinder or pipe is formed with a spigot and fawcett with the inner edge of the fawcett chamfered off, the joint being made water-tight by placing a small ring of india-rubber or other material over the spigot, and the two lengths secured by bolts and nuts. It will thus be seen that the pump is entirely novel and very simple, so that if it works as the inventor anticipates it cannot fail to be very economic.

Aug. 19.

PATELEY BRIDGE MINES.

SIR.—Capt. Williams, of the Van, inspected the above for us in April, 1877. He then directed certain works to be undertaken so that the success of the company might be assured, but I do not see that anything of the sort has been done, so we are in no better position now than we were then. Thus time and money have both been lost. Now, however, that a discovery has been made worth 10 tons of lead per fathom, and the mine proved to be all that was expected, I trust the direction will at once carry out the suggestions of Capt. Williams, and not lose the present opportunity. What Captain Williams recommended was identical with the course advocated by our esteemed director, Mr. George Batters—proving the course of ore in the 30 fm. level, and draining the mine by a cross-cut from the Eagle level, which would unwater all the workings to a depth of between 30 and 50 fms., and make Pateley Bridge one of the most profitable mines in Yorkshire. To provide the funds for this object it would be necessary to create and issue another 1000 shares—5000l. The capital would then be only 25,000l.; at present it is 20,000l. My impression is that the result of the expenditure of this amount would be works unrivalled for economy and efficiency.

Among many good mines brought out by Mr. Batters, Van and West Chiverton being conspicuous, Pateley Bridge will, I feel certain, not rank least, and I think success will be secured by adopting the recommendations of Capt. Williams, above referred to (I quote from his report):—"It seems to me that you will never make a mine of it unless you sink an engine-shaft from surface, and where should it be sunk so as to be most serviceable and command the whole mine with its several lodes? A level called the Eagle level has been driven towards your eastern boundary, in which they encountered a very strong stream of water, sufficient to drive a water-wheel. It is believed that this level drains the Sun vein, which to a certain extent has been proved, because the shaft on Sun vein near the end of the level was sunk dry 30 fms. below that level, and it was the want of sufficient ventilation to keep their candles alight that forced them to abandon it. If (as before stated) the present trials prove satisfactorily that the lode is productive below water-level, I should say sink your shaft from surface, and drop upon the shaft already sunk 30 fms. deep on Sun vein. This done, you can drive east on the Sun vein, and by crossing south intersect, prove, and drain all the principal lodes in the sett, as from the Sun vein the water would probably drain into the Eagle level, which I understand is about 60 fathoms deeper than Sun vein level, or 30 fathoms deeper than bottom of shaft. If these trials which you are now prosecuting turn out so successful as to guarantee the sinking of the shaft, you will by developing the mine in the manner herein described open out as fine a mine as any in England, as you would then be in a position to open it up on a very large scale, having overcome the great hindrance of water."

With success obtained, my shares, now worth 5l., which I consider simply nothing, would stand at many times that amount. My idea is that we must have the benefit of Mr. Batters' practical experience, and I wish to impress this upon my co-shareholders. I am also desirous to draw public attention to the remarks of Messrs. Watson Brothers in your last two issues. I am quite willing to take my *pro rata* interest in the new issue of 1000 shares, provided this work is to be carried out as recommended, and that the present fine discovery is not thrown away.

London, Aug. 20.

MINING IN NORTH WALES.

SIR.—I have before alluded in your valuable Journal to the great extent of undeveloped yet highly mineralised, though unwrought, ground both in the mountain limestone and the millstone grit. There are, however, strong indications of a favourable reaction, and I hope are long to have the pleasure of recording the resuscitation of several highly promising, though for a time dormant, concerns. It is, however, necessary, in the face of this reviving activity, to select undertakings possessing the true elements of success, while discountenancing spurious and reckless speculation. There has been a happy blending of three well-known mines under one banner as a limited company—the Belgrave, Black Mountain, and East Pant-du—and probably for promise and substantial prospective results enterprises of greater merits could scarcely be selected throughout the whole district.

Belgrave is well worthy of a spirited resuscitation, and a glance at the section of former workings in the possession of Capt. Roberts will give some idea of the mass of ore ground gone down, and the productive stoping ground existing, and only awaiting development in depth. There is much important information to be gathered from old miners, as well as a study of the rock formation and the characteristics of the lodes embedded therein. Having regard to all these, and coupling the crystallised constituents of the veins—can, quartz, lime, gossan, and ores—with geological features generally, I am confirmed in the belief that Belgrave will prove a great and important prize. It is stated by those who ought to be well acquainted with the working now filled with water, that at the 117 fathom level, 70 fms east of shaft, a sump was sunk and large quantities of ore extracted. Up to this discovery it was apprehended that the long course of ore previously wrought was unbottomed. At the bottom of this sump the lode was cross-cutted to the foot-wall, and a sight presented unprecedented for riches throughout its long and prosperous career; in fact, both forebays were solid masses of ore. Subsequently three other cross-cuts were extended at greater depths, and with equally good results. These discoveries prove that the ore is not unbottomed, but more concentrated and pure in depth. Hence I have no question of doubt as to the fact that the next section of 50 fms. in depth will be found far richer and purer in its yield of lead ore than hitherto the workings

have proved. In my next I shall refer to the Black Mountain and East Pant-du, merely observing that I hope that Capt. Roberts will be as successful in the former as he has been in the latter. Both of these are in the millstone grit formation, as also is the Cribwlyn and Lead Era. This latter is likely to prove an early, inexpensive, and important prize.—*Nant, Llanarmon, Aug. 20.* J. A. EDE.

THE ENGLISH LEAD TRADE.

SIR.—If one thing more than others connected with lead mining should illustrate the great advantages arising from being able to utilise water-power, it would be the continuance of the present low values for ores, as it must be apparent to everyone that, if under existing circumstances profit is to be made, it is chiefly by undertakings which possess opportunities so afforded for inexpensive working that we must look for such a result, inasmuch as during the period named in a former communication, when some statistics of produce of the mines of Cardiganshire (which for the greater part enjoy this privilege) were given. The fluctuations in ore value were on more than one occasion fully as great as those of the past year or so. This fact, however, did not preclude the division of profits for the time being, so far as the mines of this county were concerned, and yet we find on one or two occasions that ore from the Lisburne Mines realised only 9l. 5s. and 9l. 10s. per ton for a whole year through; such average estimate, of course, including sales of the rich as well as poor ores from the several mines of the company, and necessarily showing that the quotations for certain quantities were infinitely lower than have been prevalent ever within the past few months. How much of the profits so realised by the mine proprietors may be considered to have resulted from the use of water-power instead of the more expensive steam machinery does not, perhaps, appear in any published report, but the fact that the mines under consideration are so worked ought to afford some estimate of the value to be attached to such an advantage in seasons of low prices for produce, when we take into account the amount of cost which otherwise must have been incurred.

So numerous are the productive and profitable mines which may fairly be said to constitute the Lisburne range that the difficulty would be to name one of them that in its past career has not only yielded large quantities of ore but has given increased produce when worked in depth; it is singular, therefore, that so very few have been developed with such vigour as one would have expected to find when the facilities for so doing are borne in mind, as the deeper and more productive levels are comparatively unworked, notwithstanding the abundance of motive power requisite for sinking, drawing, &c., which is in many cases absolutely at command, and the additional encouragement which the prosecution of work in a legitimate and minor-like manner in some few instances has already afforded. Of these it must be said that in almost every case the result of the extended operations has been the discovery of increased wealth, while it has now become a matter of history that even such mines as Glogfawr, Glogfach, Logylas, Frongoch, and others—that each in their turn have given almost fabulous riches to their fortunate possessors—would for the greater part have still remained undeveloped but for the perseverance with which a well-known able mining celebrity (now no more) insisted that the immense mineral wealth since realised "only awaited the miner's pick"—a prediction which has already been sufficiently fulfilled, but which will probably be still more amply justified in the future.

Bishopsgate-street Within, Aug. 22. JOHN OWEN.

GREAT WESTERN COLLIERY COMPANY.

SIR.—In last week's Journal, under the head of "Report from Corrwall," there is a reference made to the respective merits of the Main Colliery and Great Western coals, used at the West Seton Mine, which may prejudice the latter in the Cornish market. It is stated—"They used to buy Main Colliery coal at 15s. 6d., which gave a duty of 67,000,000. Now they buy Great Western at 17s. 6d., which has only raised the duty to 72,000,000," &c., the inference being that the lower priced coal is the cheapest. This, of course, we are bound to admit if the prices and the results are correctly stated. Of the prices we do not care now to speak, but as to the published results we scarcely think they are correct. We have little hesitation in saying that our large coal will do 20 to 25 per cent. more duty than the coal formerly supplied, or supposed to be supplied, from the Main Colliery, and that our large will do far more duty than the large from any Neath colliery. Whether this is so or not can easily be proved. We are quite prepared to have our coal fairly tested against the coal hitherto generally used at Cornish mines, believing that the results would astonish some of the managers, and convince them that they would save considerably by using our coal at the higher price you mentioned.

WM. JONES.

(Agent for the Great Western Colliery Company, Limited.)

Cardiff, Aug. 22.

THE IRON ORES OF CORNWALL AND DEVON.

SIR.—It gives much pleasure to those interested in mining in Cornwall and Devonshire to see in the Journal of August 10 that a strong company is being formed for thoroughly working the large deposits of spathic iron ore in the Perran great lode, and others adjoining, as well as the silver-lead lodes, and it is generally believed, if efficiently worked, that it will prove a success to all who may succeed in securing an interest, as the quality of the iron ore is good, as also is that of the rich red and brown hematite lodes worked by the Ebbw Vale Company, at Brendon Hills. But I cannot agree with the statement of answer to Question 250—of there being a small deposit of this rich ore on Exmoor, as I believe that the main and large bodies of ore in the Western Counties are in these hills, and when the railway now being projected is made to Combarmin an almost unlimited quantity of this ore can be gotten above the valleys, and when needed to go below there is sufficient water-power for pumping and drawing the ore from any depth. I also believe there is a sufficiency of the richest quality iron ore in the Western Counties to supply South Wales with the best material for steel making for ages to come, and when the railways and tramways to them are opened there will be no need, or we shall not be dependent, for the importation of iron ores from Spain or other countries, as we have near the smelting works equally good, if not better, ores for the making of steel, and that can be delivered at the furnace at a cheaper rate, and good quality, material at a less price must eventually tell its own tale and come off victorious.—*North Devon, Aug. 19.* M. E.

OLD TREBURGETT SILVER AND LEAD MINE.

GREAT EXCITEMENT AT ST. TEATH.

SIR.—About a fortnight since the miners of Old Treburgett sued the executrixes of the late Mr. John Tucker, of Branscombe, Devon, for two months' money owing to them for work done in said mine. The facts of the case are these:—Some time ago the mine fell in liquidation, and Mr. Tucker restrained the materials for dues, at the same time appointing his son, Mr. Samuel Tucker, as his representative. The old gentleman fearing the men would stop working (which I hear they would have done) authorised Mr. S. Tucker, by letter, to employ them, with the assurance that all was right with reference to their wages, which the said gentleman positively swore to before Mr. Justice Bore, at the Camelford County Court, and what surprised every one in Court after such evidence (beside several important witnesses) was the extraordinary judgment given by his honour.—That the men be paid off with the proceeds of the lead raised at the time, which will amount to about 4s. in 1l. On this I make no comment. Now, what has raised the indignation of the men is, that a few weeks before the Court the agents advised the men to "sue the executrixes of the late John Tucker, for they were certainly liable;" but when Capt. Hancock gave evidence in Court, to the men's surprise, he swore that Mr. Felix Wilson, of London, the liquidator, was the only employer. This unexpected event, and the stopping by them (the managers) of one of the best mines in the county, simply because they fell out with one of the lords, has so exasperated the miners and the general public that they (the captains) have seen fit to have two or three policemen in the village

every night, as they think, to protect them. We feel fully persuaded that such a quiet well-behaved lot of men would not in any way commit themselves, but we are forcibly reminded of a saying of Shakespeare's, "Conscience makes cowards of us all," as up to this time this has been one of the quietest villages in England.

St. Teath, Aug. 20.

OBSERVER.

MINING AS AN INVESTMENT FOR CAPITAL.

PANT-Y-MWYN MINES, NEAR MOLD.

SIR.—It is very satisfactory to find that these mines are beginning to bear out the opinion I expressed of them in my letter of October last, at the same time recommending the purchase of shares at the then price, 2l. each, or par; the present market value being 5l. to 5½l., or 250 to 262½ per cent. premium, and when more vigorously developed will soon be trebled. During the year ending June 30 264 tons of lead ore have been raised, the value being 3231l. 5s., the working costs were 1342l. 1s. 2d., leaving a profit of 1889l. 3s. 10d., or 58½ per cent. on the total sales, the working cost being 4½ per cent. The dividend for the half-year is 2s. per 2l. share, equal to 10 per cent. per annum.

THE BRITISH SILVER-LEAD MINES, NEAR FESTINIOG.

The late discovery at these mines still continues, and is of the same value as last reported. We have also discovered a fine "sett stone" on the property, which with the silver-lead ore, blende, and slates will be opened out as rapidly as possible, and it is fully expected, give large profits.

It is also very pleasing to record that the consumption of pig and sheet lead is increasing greatly, the imports last month being nearly double that of the corresponding month last year. With the aid of boring machinery there is no reason why this country should not supply its own market, and as cheap as our foreign friends.

Berse Cottage, Aug. 21.

JOHN L. M. FRASER.

MINING IN CARDIGANSHIRE—TYN-Y-FRON.

SIR.—Being in company with Mr. T. P. Thomas underground at this mine on Aug. 11, I found that the deep adit level had laid open a rich course of lead and blende ores for 70 fms. long, the lode in places being considerably more than 60 ft. wide, and since we commenced to cut down the sides of the Frongoch Mine I have not seen its equal. In my opinion a great deal more, and to the purpose, might have been said of the prospects of this mine than has hitherto been expressed; but as it is not my intention (at present at least) to make a long report, I will merely say that it is evident to any practical miner, and more especially to those who have had a long term of connection with the mines of this county, that the many different branches of lead and blende ores are concentrating in depth, and that in 15 fms. under the present adit workings one of the finest courses of ore may more than fairly be expected to be developed than has been done since the time I have made allusion to the discovery at Frongoch Mine.

Aberystwith, Aug. 21.

ABSALOM FRANCIS.

PANDORA MINE.

SIR.—It is not my intention to reply to the anonymous letters (doubtless all emanating from one source, for there is a wonderful similarity in their style) in reference to this matter. Writers who can make accusations and cast innuendoes against an open opponent, and yet dare not sign their names to what they write, can only expect to be treated with silence. I will reply to any genuine letter, but not to an anonymous one.

The letter of Mr. Cooke is in a different category, and I will answer him by expressing my surprise that he who beyond all shareholders has taken counsel with me as to the necessity of some steps being initiated for the purpose of procuring a different local manager, a change in the constitution of the board, and an alteration of the office, should now "hope that confidence may be renewed in the present management."

Has all this change of views come about because the proposed office is a different one to what he expected, and how is it that he commends to the shareholders' perusal a circular of the directors, containing allegations which he admits to be incorrect? Mr. Cooke will excuse me if I say that his sudden support of a management with which he is professedly discontented is very much like an attempt "to run with the hare and hunt with the hounds." Mr. Cooke is quite in error in supposing that I covet the appointment of secretary of Pandora. I have no intention of accepting the secretaryship of that or any other mine. In conclusion, I may say once and for all that it is a matter of indifference to the Mineral Corporation whether its offer is accepted or not by the Pandora shareholders. It is perfectly agreed that the requested assistance will be given on no other terms than those offered.

J. H. CROFTS.

PANDORA MINING COMPANY.

SIR.—I have received another long circular from Mr. Crofts, which is one of the weakest and most laboured productions I ever read. It in no way meets the plain statements of the directors, who have, however, issued a notice to say that it contains important misstatements, like Mr. Crofts' previous circular, and that they will be fully replied to as far as is required at the general meeting on Monday. I am glad to hear that the directors will be supported by a large majority.—*Aug. 22.* A LARGE SHAREHOLDER.

PANDORA MINE.

SIR.—Absence from home prevented my seeing until now the letters respecting Pandora in the Supplement to the Journal of Aug. 10. This I regret, as it was due to the shareholders that they be at once disabused of the idea that my letter was in any way inspired by the management; it was not even written with their knowledge, nor do I think the language I used was such as to warrant Mr. Crofts' ungenerous insinuation, either as regards myself, the anonymous writer, or the directors of the mine, to whom I am altogether unknown. I am entirely independent of and unconnected with them, except as an ordinary shareholder; nor have I had any communication, either direct or indirect, with or from the management, except what has been furnished to every shareholder. But this does not prevent my exercising my ordinary common sense, the expression of which anonymously will cause my words to be regarded at all only so far as they find an echo in the common sense of others also.

Pandora has a number of shares unissued, and as the directors have shown, requires a certain additional outlay for profitable working; but I do not see that need, for the money these shares would produce necessarily implies such mismanagement as would warrant so sweeping a measure as a change in directors, mine captain, and London office; the whole of the working staff, in fact. And what are we asked to accept instead? Who are the "Mineral Corporation?" and who are their so trusty directors that we are to place our mine in their hands? These and other questions put by our directors yet await an answer. The bait thrown out, the taking of the 700 shares will, by the time the meeting of Aug. 26 is held, have ceased to possess any attraction, as they will have been taken up amongst ourselves, it appears, and will furnish the necessary appliances for the proper and uninterrupted working of the mine. Instead of turning out our directors, let us strengthen their hands to do what they themselves propose.

With respect to the local management, if it can be shown to the satisfaction of the shareholders that Capt. Nottingham's absence have been prejudicial (which, we must remember, has been insinuated only, and not proved), let a more constant attendance in future be required, and let him be paid accordingly.

As to change of office, allow me to ask what mines in Mr. Crofts' office have been so very successful as that we should, for his sake, throw overboard a tried and respected servant like Mr. Murchison? Let me, even anonymously, ask my fellow shareholders not to be hasty in this matter, but to read carefully and dispassionately the published answer of our directors to Mr. Crofts' circular, and at which I for one consider straightforward and satisfactory, and at the coming meeting to require the very fullest and most unreserved information as to the Mineral Corporation, its status, its management, and its prospects. Even if dissatisfied with our present man-

YORKER PENINSULA MINING COMPANY (Limited).—The report to the annual meeting of this company, on Aug. 27, states that the Kurilla Mine has continued to open up in a manner that has quite realised expectations; but, owing to the decline in the price of copper, they have not been able to do much more than pay their way out of the proceeds of ore raised. Much, however, of the work done has been directed to laying open reserves of ore, now estimated at 3500 tons, to be taken out as soon as there shall be a rise in the price of copper. At the same time, the cost of getting and dressing the ore, and of working the mine generally, would be lessened by the application of the most approved machinery and appliances.

PRINCE OF WALES SLATE COMPANY (Limited).—A company is in course of formation under this title to acquire and work four valuable slate quarries in Carnarvonshire, known as Prince of Wales, Princess of Wales, Blaen y Pennant, and Gorsedd. These quarries have been brought into a productive state by pioneer companies exhausted in the process. For example, on the first named property no less than £1,000, has been spent on the development by open workings, and providing plant and machinery for carrying on a large business. The slate vein is 150 yards wide, and runs the whole length of the property. There have been opened eight galleries, each 18 yards in depth, altogether 420 yards in length, which can be worked to a depth of 150 yards without lifting or pumping. There is unlimited tip for rubbish,

IMPROVED BLAST-FURNACE.

An improved construction of furnace has been designed by Mr. JOHN F. BENNETT, of Pittsburgh, U.S., the inner walls of which constitute substantially two frustums of cones, placed base to base, the lower one resting its smaller end upon the foundation or hearth, and extending upward one-third the height of the furnace, or to the point of greatest area in cross section, the upper cone beginning with its largest end at such point of greatest area, and extending upward two-thirds of the height of the furnace. The inner diameter of the furnace at the base or hearth is, by preference, two-fifths of the whole height of the furnace, and the area in cross section, at the belly or point of greatest diameter is not less than twice, nor greater than three times, the area at the base. The area of the throat is, by preference, the same as of the base, but may be increased by one-half when desired, as when the relative area at the point of greatest diameter is increased. The area of the charging opening in the throat, which is closed by a bell as usual, is made about one-half the area of the throat.

The tuyeres are inserted through the walls of the furnace at a height above the base equal to one-half the diameter of the base, or one-fifth the height of the furnace. This position of the tuyeres is given as affording the best results with a blast of about 5 lbs. to the square inch, and of a temperature of about 1000° Fahr. If the blast be weaker, say 1 lb., giving a blast of 4 lbs. to the square inch, then the tuyeres should be lowered a little, depending upon the capacity of the furnace, so as to keep the molten metal below sufficiently heated. The higher the tuyeres are placed, and at the same time a sufficient heat be maintained below, the more productive will be the furnace, for the zone or belt of fusion will thereby be increased. The dimensions given to the base of the furnace provide for a much larger plane chamber or zone in which fusion takes place, and the heat from the same is correspondingly increased. This of itself enables the tuyeres to be placed higher in the furnace than could be done in the old form, as such increased heat above assists in keeping the metal below properly heated.

Instead of placing the nozzles of these tuyeres even with the inner face of the wall, as has heretofore been done, they are, according to the present invention, made to project into the interior of the furnace, by preference, until their nozzles reach an imaginary circle, which will divide the area at that cross section into two equal parts, or in any case they project to such distance that the reflex currents made by the mutual action of the several jets shall not return or strike back against the walls of the furnace, or until they shall have been converted into carbonic oxide gas or carbonic acid gas, in which condition they will not act destructively on the lining. By this arrangement the walls are subjected in a much less degree to the destructive action of the heat and gases of the furnace, and in consequence of the diminished activity thus secured about the walls, particles of free or nearly free carbon settle upon and become attached to the walls. This accumulating carbon forms in course of time a coating, closely resembling in its nature blacklead or plumbago, and making substantially the lower part of the furnace a blacklead crucible, which practically never wears out, for it continually renews itself by the action of the furnace as worn away by the attrition of the descending charge or stock. And it is partly with a view to the formation of this coat or lining that the furnace is constructed with so great area in cross section at the base, as room is thus provided for the same between the face of the wall and nozzles of the tuyeres, and also provide for free passage of the molten metal and slags through the space between the nozzles, which is always kept clear by the action of the blast.

An additional advantage is also secured by the enlarged size of this part of the furnace, as the area of the zone of fusion above the tuyeres is thereby materially increased, and other things being equal, the productiveness of a furnace of given capacity depends upon the area of this zone; and, furthermore, the walls of the furnace being further removed from the ascending gases, which are generated near the centre, do not as readily take to the walls for passage, but rather ascend up through the body of the charge and permeate the whole mass. This last result is also in a measure secured by the even distribution of the charge secured as before described by the reduced charging hole. By making the lower part of the furnace of a continuous conical form, not only is the area of the zone of fusion increased, as already described, but also the angle formerly made at the top of the well, or at the junction of boshes and well is avoided, thus securing a freer action of the furnace.

PNEUMATIC DRYING-MACHINE FOR MINERALS.*

The appearance and principal working parts of this machine, butches, sieves, and plungers, are similar to those of continuous jiggling machines, as used for the finer sizes of mineral in ore or coal dressing; but the hutch, instead of being entirely or only partially filled with water, so that a space filled with air is enclosed below the plunger and sieve bottoms. The material to be dried, such as purified slack from coal-washing machines, is received upon the sieve in a layer of about 6 inches deep, and is traversed slowly forward by a screw creper running along the whole length of the machine. The three plungers, one to each sieve, are mounted on a shaft by eccentrics, and receive motion by a crank and lever combination, so that the down-stroke is made more rapidly than the up-stroke. As the piston descends the air standing above the water is compressed to an amount regulated by loaded spring valves on the sides of the hutch, and the layer of mineral is loosened upon the sieve, the holes in the latter being cleared from any particles of mud that may have lodged in them. On the return stroke the piston acts as an exhauster, and the external air, rushing through the layer of mineral, to compensate for the partial vacuum formed, carries away a considerable portion of the adherent water. The sieves used must be of a very fine mesh, so as to be practically impermeable to the mineral while allowing a free air-way. The water level, as well as the discharge of any particles of mud that may pass through the sieves, is regulated by syphons fixed at particular levels in the side of the hutch. This machine has been adopted at the Sulkow Coal Mine, near Pilsen, in Bohemia, for drying washed slack, the particles gauging one-fifth of an inch and below. The sieves are made of fine hair cloth, and the material leaves the machine sufficiently dried to be fit for charging in the coke ovens.

* By RICH, MEINICKE, and WOLFF: Oesterreichische Zeitschrift für Berg- und Hüttenwesen.

From JAMES FORREST'S "Abstracts of Papers in Foreign Transactions and Periodicals," for the Proceedings of the Institution of Civil Engineers.

PROTECTING ARTIFICIAL STONE.—The invention of Mr. W. SMITH, of Dublin, for rendering concrete and artificial stone air-tight, consists in bituminising these materials with certain proportions of pitch and creosote, or other heavy oils obtained in the destructive distillation of tar or stone in a hot or cold state, either under the normal atmospheric pressure or any other greater or lesser pressure. The proportions of the mixture to be regulated by the amount of pitch which the oil can dissolve at the required temperature.

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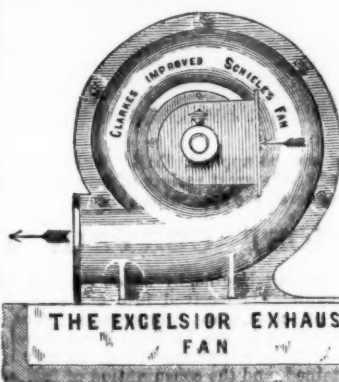
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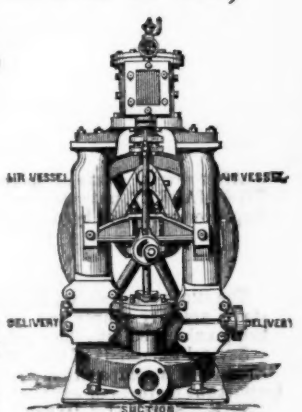
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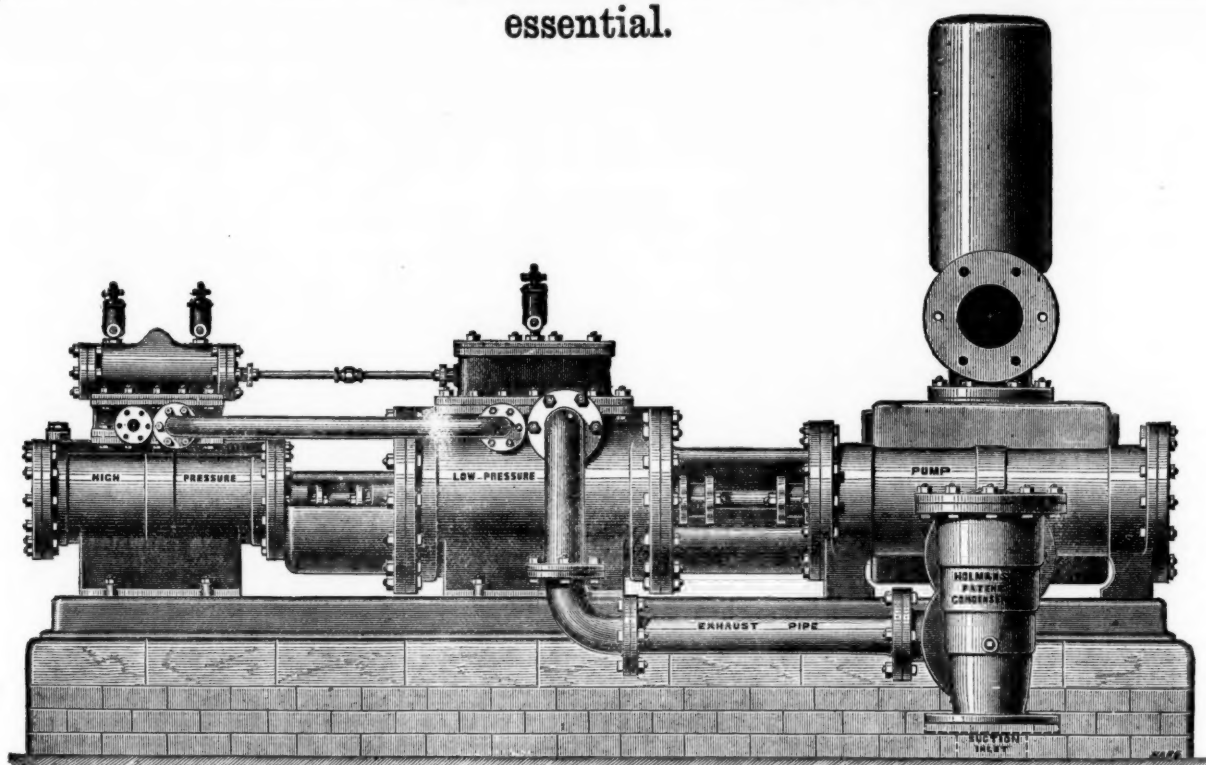
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After several years of successful application for all purposes to which steam-driven pumps can be applied, THE "SPECIAL" STEAM PUMP STILL MAINTAINS THE FIRST POSITION IN THE MARKET, notwithstanding that it alone—of all direct-acting pumps—has been subjected to the great variety of severe tests that must be encountered in such a period of time. Some valuable improvements have been suggested in the course of a long experience, and their adoption has rendered the apparatus at once

THE SIMPLEST AND MOST CERTAIN IN ACTION.

The illustration shows an extension of the principle of this Pump to a Compound Steam Pumping Engine, by which the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere. The Engine combines simplicity, certainty of action, great compactness, fewness of parts, and consequent reduction in wear and tear.

Several thousands of the "Special" Steam Pumping Engines, with high-pressure cylinders only, are in use in British and Foreign Mines, Water Works, &c.,—and for confined situations, or where Engines of a comparatively small size only are necessary, they will still meet all requirements—but their application will be very largely increased, since it has been found practicable to embrace the important features of expanding and condensing the steam, so that increased power may be obtained, and the consumption of fuel greatly economised.

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SIZES AND PARTICULARS.

Diameter of High-pressure Cylinder.....In.	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Ditto of Low-pressure Cylinder.....In.	14	14	14	18	18	18	18	21	21	21	21	24	24	24	24
Ditto of Water Cylinder.....In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Length of stroke.....In.	24	24	24	24	24	24	24	24	24	24	24	36	36	36	36
Gallons per hour approximate.....	3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450	35,225
Diameter Suction and Delivery.....In.	3	3½	4	3½	4	5	6	4	5	6	8	5	6	8	9
Diameter High-pressure Steam Inlet.....In.	1½	1½	1½	1½	1½	1½	1½	2½	2½	2½	2½	2½	2½	2½	2½
Diameter Low-pressure Steam Exhaust.....In.	1½	1½	1½	1½	1½	1½	1½	2½	2½	2½	2½	2½	2½	2½	2½
Height in feet water can be raised with 40 lbs. pressure per square inch in } Non-condensing...	360	330	160	360	250	184	140	360	264	202	130	360	275	175	122
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234	162
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	203	203

CONTINUED.

Diameter of High-pressure Cylinder.....In.	16	16	16	16	18	18	18	21	21	21	24	24	24	30	30
Ditto of Low-pressure Cylinder.....In.	28	28	28	28	32	32	32	36	36	36	42	42	42	52	52
Ditto of Water Cylinder.....In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	14
Length of stroke.....In.	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate.....	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,950	47,950
Diameter Suction and Delivery.....In.	6	8	9	10	6	8	9	10	8	9	10	8	9	10	10
Diameter High-pressure Steam Inlet.....In.	2½	2½	2½	2½	3	3	3	3½	3½	3½	4	4	4	5	5
Diameter Low-pressure Steam Exhaust.....In.	3	2	3	3	3½	3½	3½	3½	4	4	4	5	5	5	6
Height in feet water can be raised with 40 lbs. pressure per square inch in } Non-condensing...	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352	750
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	191	750	486	337	248	660	450	337	864	600	440	937

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

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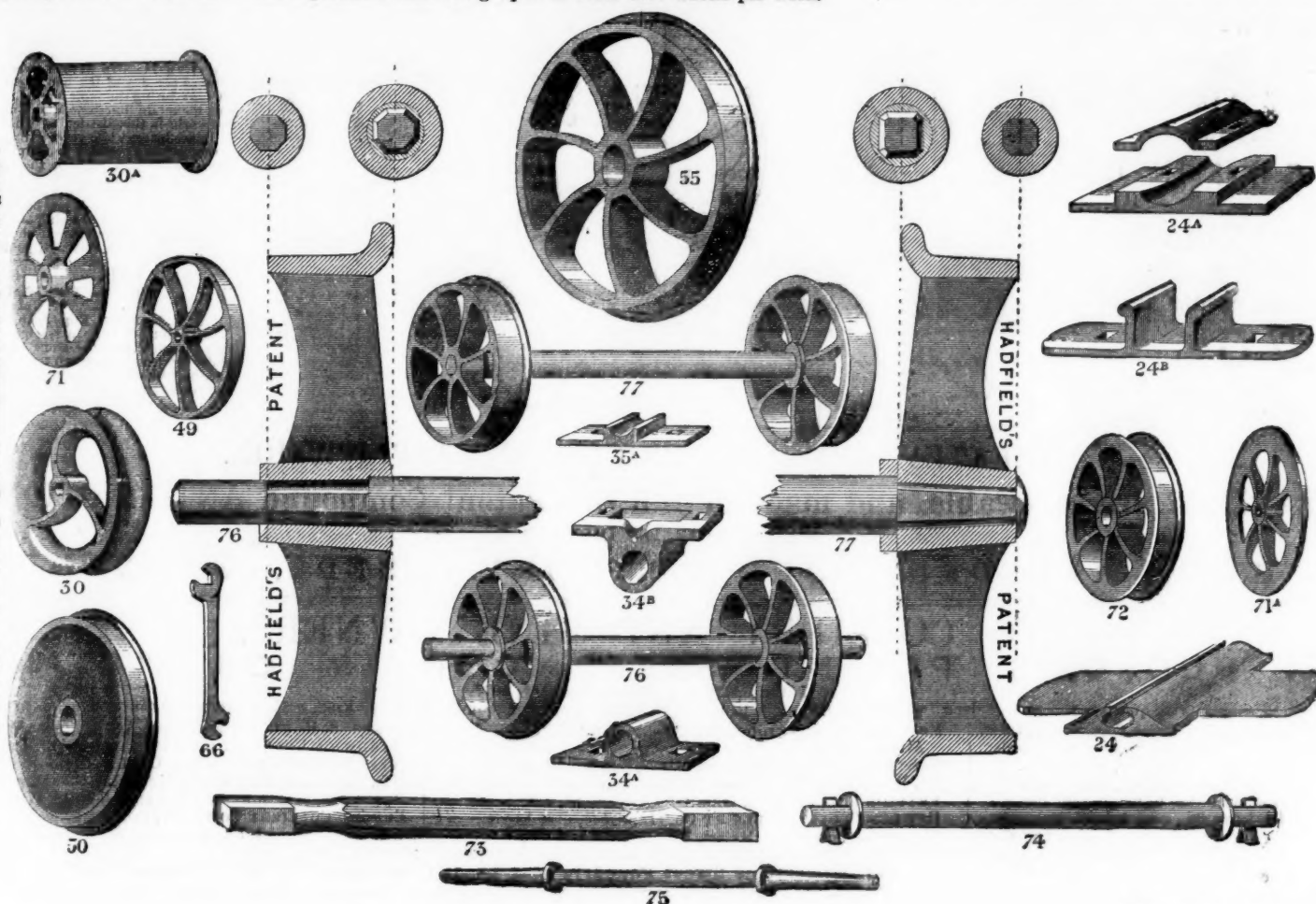
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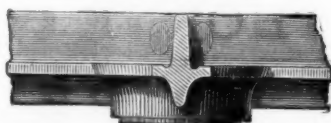
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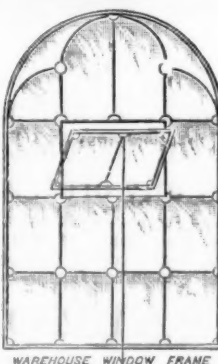
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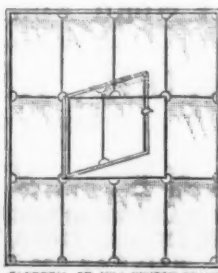
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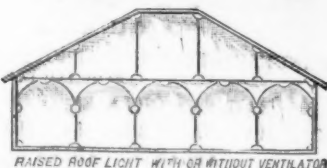
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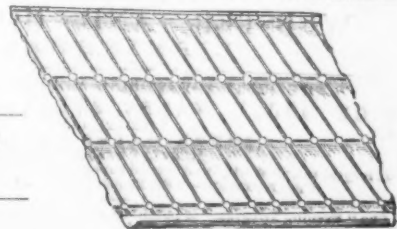
Security is obtained in
these Skylights with-
out Guard Bars, and
with less obstruction
to Light.

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SKYLIGHT
CROSS BAR

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H. R. MARSDEN will exhibit in full operation at the Manchester, Liverpool, and North Lancashire Show, at Lancaster, September 3rd to 5th, one of his

New patent Stone Breakers, with Screening Apparatus,

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Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

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New Patent Reversible Jaws,
in Sections, with Patent
Faced Backs.

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TOGGLES.

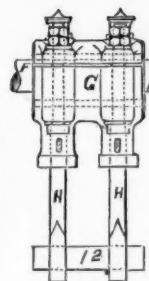
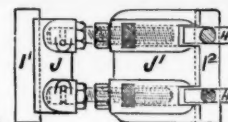
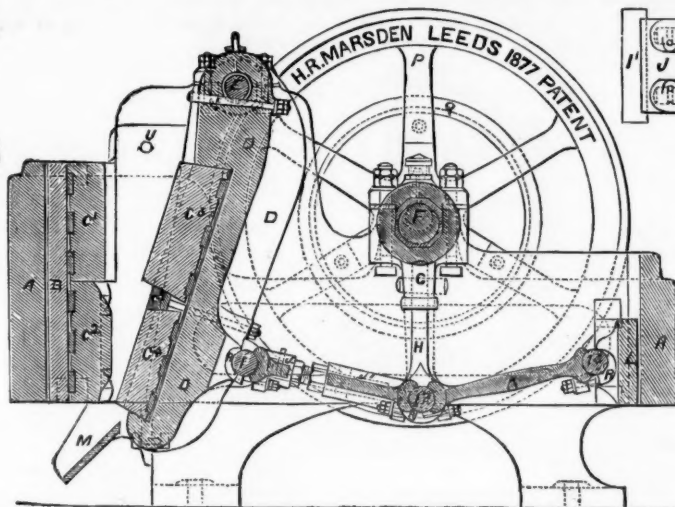
OVER 2500 IN USE.

New Patent Draw-back
Motion.

NEW PATENT STEEL TOGGLE BEARINGS.

70

PRIZE MEDALS.



READ THIS—

Wharhole Lime Works, Maryport, Whitehaven,
November 7, 1878.
H. R. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.
DEAR SIR,—The machine I have in use is one of the large
size, 24 in. by 12 in. The quantity we are breaking daily with
this one machine is 250 tons, the jaw being set to break to a
size of 2½ in. We have, however, frequently broken over
300 tons per day of ten hours, and on several occasions over
350 tons during the same period. The stone we break is the
blue mountain limestone, and is used as a flux in the various
ironworks in this district. We have now had this machine in
daily use for over two years without repairs of any kind, and
have never had occasion to complain of any inconvenience in
using the machine. I hope the one you are now making for
me may do its work equally well. The cost—including EN-
GINE-POWER, COALS, ENGINEMAN, FEEDING, and all EXPENSES
OF EVERY KIND—is just 3d. per ton. Should any of your
friends feel desirous of seeing one of your machines at work,
I shall have much pleasure in showing the one alluded to.
I am, dear Sir, yours very truly,
WILLIAM MILLER.

AND THIS—

Wharhole Lime Works, Aspatria, Cumberland,
July 11th, 1878.
H. R. MARSDEN, Esq., Soho Foundry, Leeds.
DEAR SIR,—We are in receipt of your letter of 4th inst. I
may just state that the stone breaker above named has been
under my personal superintendence since its erection, and I
have no hesitation in saying that it is as good now as it was
five years ago.
I am, dear Sir, yours faithfully,
FRANCIS GOULD.

GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

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TO COLLIERY AND MINE OWNERS.

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Entire new principle, saving three-quarters to 2 cwt. "dead" weight per corve. Will hold 2 to 3 cwt. more coal than the ordinary kind, without increasing the outside dimensions. Adopted by—
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